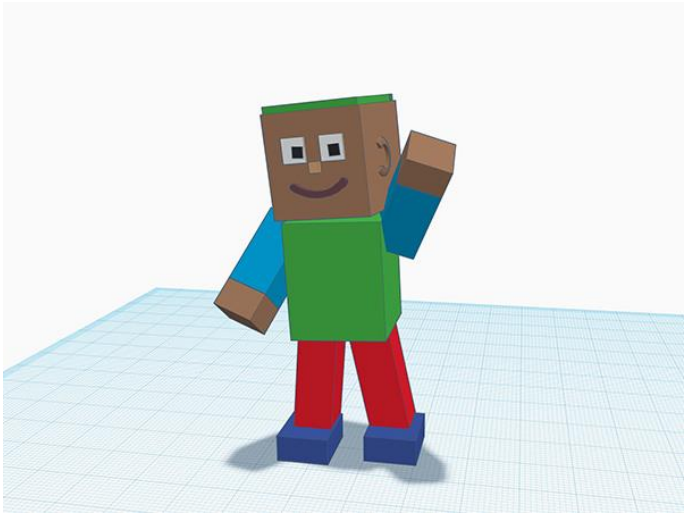
AUTODESK® TINKERCAD®

Lesson Plan: Create Your Own Avatar



Grades: 4 – 7 (US)

Duration: 5 hours

Skills:

- 2D design
- 3D design
- Mathematical computation
- Visual communication

Subjects:

- Art
- Design
- Math

Lesson Plan Overview

Students design an avatar either based on themselves or a fictional person. First, they create a detailed list of adjectives describing the avatar's physical traits. Next, they draw a 2D sketch of their avatar design and measure the dimensions. And then finally, they create their design in 3D using Tinkercad or art materials. The estimated duration is provided for each unit in the lesson, giving you the flexibility to adjust as needed. This lesson requires no previous experience in 3D design or Tinkercad.

Learning Objectives

- Develop a vocabulary that can help you express ideas.
- Create a 2D representation of a character using papercraft materials.
- Create a 3D representation of a character within Tinkercad.
- Use mathematical computation to solve real-world problems.
- Introduce a 3D avatar to the teacher or the class.

Standards

- **ISTE Standard 4 | Innovative Designer:** Students use a variety of technologies within a design process to identify and solve problems by creating new, useful, or imaginative solutions.

- **ISTE Standard 6 | Creative Communicator:** Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.
- **CCSS, Grade 4, Measurement & Data:** Solve problems involving measurement and conversion of measurements.
- **CCSS, Grade 5, Number & Operations in Base Ten:** Perform operations with multi-digit whole numbers and with decimals to hundredths.
- **CCSS, Grade 5, Geometric Measurements:** Understand concepts of volume.
- **CCSS, Grade 5, Number & Operations in Base Ten:** Perform operations with multi-digit whole numbers and with decimals to hundredths.
- **CCSS, Grade 6, Geometry:** Solve real-world and mathematical problems involving area, surface area, and volume.

For more information about standards used in this lesson plan, visit these websites:

- ISTE: https://www.iste.org/standards/for-students
- Common Core (Math): http://www.corestandards.org/Math/Content/4/introduction/

Materials

This is a list of materials each student will need to complete this lesson.

- Computer or tablet with access to the Internet and Tinkercad
- Graph paper
- Ruler
- Computer with slideshow software, like Google Slides, PowerPoint, or Keynote
- Paper, markers, crayons, or colored pencils/pens
- 3D printer and supplies (optional)

You'll find links below where you can directly download and print files from the Tinkercad Lesson Plan page (https://www.tinkercad.com/lessonplans/create-your-own-avatar) that your students will need for this lesson.

- Evaluation Rubric [PDF with fillable text fields]
- Physical Traits Inventory Worksheet [PDF with fillable text fields]
- Graph Paper [PDF]
- Measure Your 2D Design Worksheet [PDF with fillable text fields]

Setting Up Your Class

If students are working remotely, ask them to use an online tool approved by your school, such as Zoom, to collaborate with each other. If students are working in a classroom, they can complete this lesson individually. Review the list of materials, and ask students to make sure they have them on hand when they need them.

Design Your Avatar [2h 15m]

1. Physical Traits Inventory [60 min]

Teacher Instructions	Student Instructions
Hand out or ask students to download and complete the Physical Traits Inventory worksheet (*Please see worksheet link below.)* If you choose to have students share their character inventory descriptions with the class, consider making a running list of adjectives as students share. If needed, help students narrow down the specific traits of their characters to prepare them for the next step of creating the avatar on paper. Give them instructions about how to share their work with you.	Decide whether you'd like to base your avatar on yourself or a fictional character. You'll work individually to describe your character's physical traits, using a dictionary or thesaurus to find creative adjectives or new vocabulary words that describe your avatar's appearance. Then you'll share the traits you described with your teacher or classmates.

Materials: Physical Traits Inventory Worksheet [PDF] *(Please click the link to download the worksheet.)*

Outcome: Develop a vocabulary that can help you express ideas.

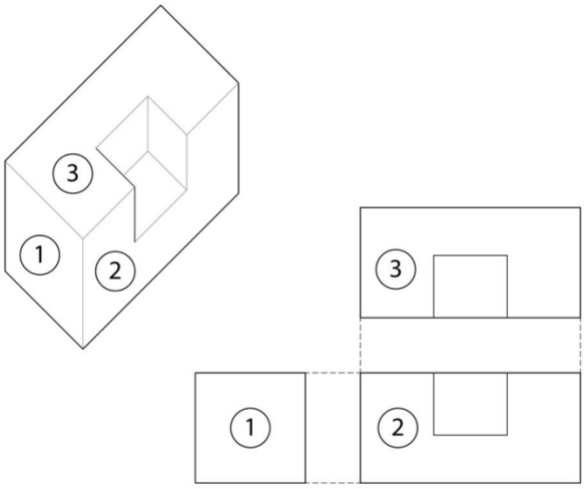
2. Learn to Draw in 2D [15 min]

Teacher Instructions	Student Instructions
If students aren't familiar with drawing in 2D, ask them to watch the video (https://www.instructables.com/lesson/Lesson-3-Drawing-in-2D/) for an overview of the process, and to take notes. The blog post (https://blog.tinkercad.com/perspective-vs.-orthogonal-view) also has helpful information and examples. Their next step will be to draw their design in 2D.	To understand something complex, it's best to look at it in pieces. You can use "orthographic projection" to break down a design and study it. This means drawing an object straight on from each of its sides. The top, front, back, left side, right side, and bottom are separate sketches. Drawing first in 2D before moving on to 3D design is helpful, because it allows you to see how each side relates to the other before building out your design. Review this blog post and video (https://www.instructables.com/lesson/Lesson-3-Drawing-in-2D/) to learn more about the basics of 2D drawing. For instructions on how to easily switch from "perspective" view to "orthogonal" view in Tinkercad, review this blog post: (https://blog.tinkercad.com/perspective-vs.-orthogonal-view).

Materials: Computer with online access to Tinkercad

Outcome: Create a 2D representation of a character.

3. Draw Your Avatar in 2D [15m]



Teacher Instructions	Student Instructions
Encourage students to use this time to plan their avatar in block form; they will have time to refine the details of their design in the upcoming steps. Planning the blocks will help them compose their avatar in 3D later. (*Please see graph paper link below.)*	Now that you've created a list of physical traits for your avatar, spend some time sketching your character in 2D block form using graph paper and pens/pencils. If you need graph paper, we've provided a link where you can download and then print a piece of paper that's formatted with graph lines. Here's an example of a 2D block sketch.

Materials:

- Graph paper [PDF] (*Please click the link to download the graph paper*.)
- Pens/pencils

Outcome: Create a 2D representation of a character.

4. Measure Your Design [15m]

Teacher Instructions	Student Instructions
Ask students to use the Measure Your 2D Design worksheet [PDF] for this step. (*Please see worksheet link below.)* Remind students how to use a ruler to find measurements of line segments, including calculating the perimeter and area of squares and rectangles. Once students have completed their preliminary drawings, they should determine the length and width of each rectangle along with the total perimeter and total area of their characters. Give them instructions about how to share their work with you.	After completing your drawing, use this worksheet to label each block you drew, and then measure the length, width, perimeter, and area of your character's form.

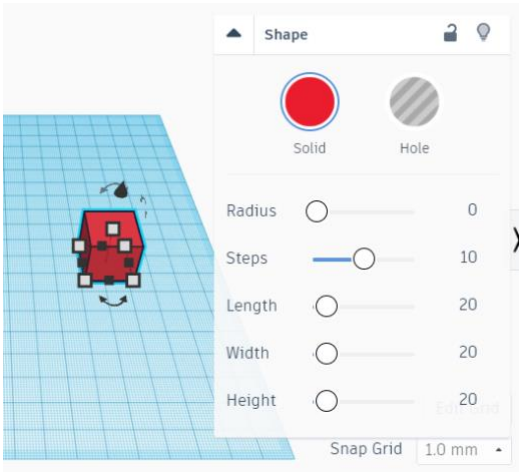
Materials:

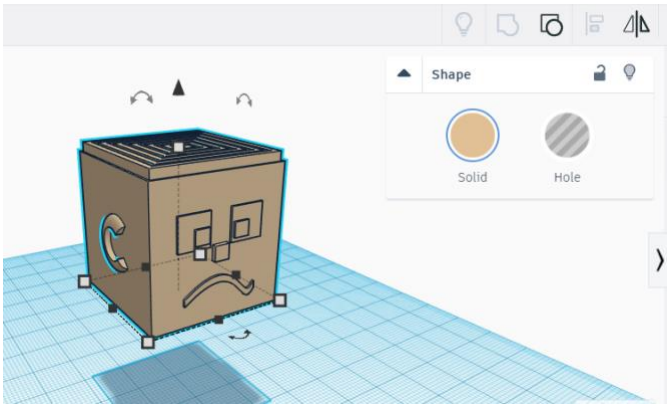
- Measure Your 2D Design Worksheet [PDF] *(Please click the link to download the worksheet.)*
- Ruler
- Pens/pencils

Outcomes:

- Create a 2D representation of a character.
- Use mathematical computation to solve real-world problems.

5. Build 3D Blocks in Tinkercad [30m]





Teacher Instructions	Student Instructions
Ask students to review these tips for building blocks in Tinkercad, and then play around with shapes in Tinkercad on their own.	Many of your character's features can be creating using the "box" shape in Tinkercad. You can change the length, width, and height of each rectangular prism as shown here. Remember to "Group" objects together as you go. Then "Ungroup" at the end to change colors.

Materials: Computer with online access to Tinkercad

Outcome: Create a 3D representation of a character using Tinkercad.

Build and Share Your Avatar [2h 30m]

6. Work With Shapes in Tinkercad [30m]

Teacher Instructions	Student Instructions
Having basic knowledge of Tinkercad will help students with this lesson. If your students aren't yet familiar with Tinkercad, guide them through or have them independently complete the brief tutorials. Encourage students to use the software to explore how to place, view, move, rotate, resize, group, and align different shapes.	If you're new to Tinkercad and 3D design or just need to refresh your knowledge, review these short tutorials. They'll guide you through working with shapes in a 3D space, including how to place, view, move, rotate, resize, group, and align different shapes. These tutorials will help you later in this lesson when you create a prototype! Follow this link to view the tutorials: https://www.tinkercad.com/learn/project-gallery;collectionId=OPC41AJJKIKDWDV

Materials:

- Computer with online access to Tinkercad
- 2D character sketch

Outcome: Create a 3D representation of a character using Tinkercad.

7. Build Your Avatar in 3D [60m]

Teacher Instructions	Student Instructions
If students have questions about using shapes in Tinkercad, review the tutorials included earlier in this lesson. After students create their 3D avatars in Tinkercad, they can print them if a 3D printer is available. They may also choose to build out their design using art materials. Give students instructions for sharing their creations with you.	Refer to your 2D drawing of your avatar, and use the measurements you documented to design your avatar in 3D within a new Tinkercad file. (Check with your teacher if you need help making an account.) Save and share your file according to your teacher's instructions. If you have access to a 3D printer, print your avatar design. If you don't have 3D printer access, use papercraft materials to build your avatar based on the design you made. *Bonus:* Measure the surface area and volume of your 3D character.

Materials:

- Computer with online access to Tinkercad
- 2D plan of character
- 3D printer with filament, OR papercraft materials such as paper, glue, scissors, markers, etc.

Outcome: Create a 3D representation of a character using Tinkercad.

8. Share Your Avatar [60m]

Teacher Instructions	Student Instructions
Depending on the structure of your class, ask students to present their avatar creations to you or to the entire class. This can be done in person or in a remote learning environment. Students should be prepared to introduce their avatar and explain the traits that the avatar has and how their planning helped them create their 3D model.	Now that you've designed and built your avatar—either using a 3D printer or paper materials—it's time to present your avatar to your teacher or your class! As a bonus, you may choose to give an oral presentation using slideshow software (like PowerPoint or Google Slides), or a brief digital video to introduce your character to others. In your presentation, be sure to include details about the physical traits you designed based on the physical traits inventory worksheet you completed, and screenshots or exported images of your work in Tinkercad. For a bonus step, include the surface area and volume of your model in your presentation.

Materials:

- Computer with online access to Tinkercad
- Presentation/slideshow software (optional)
- 2D drawing of character
- 3D model of character

Outcome: Introduce a 3D avatar to the teacher or the class.