

# Cross Reality (XR) Activities



Cross Reality (XR) Activities for community engagement

AZ 2080

March 2024



THE UNIVERSITY OF ARIZONA  
Cooperative Extension



QuiverVision.com

Print Color Play

page



## Authors

**Andie Astra**, M.A., Instructional Technology Specialist, College of Education, University of Arizona

**Gerardo U. Lopez**, M.A.T, M.Ed., Ph.D, Associate Extension Specialist STEM, School of Animal and Comparative Biomedical Sciences, College of Agriculture and Life Sciences, University of Arizona

## Production Team

**Nicholas Morris**, Ph.D, Associate in Extension, Cooperative Extension, University of Arizona

**Stacy DeVeau**, M.Ed., 4-H STEM Program Coordinator Sr., Yavapai County, Cooperative Extension, University of Arizona

**Kim Johnson**, M.A., Instructional Specialist Sr. STEM, Greenlee County, Cooperative Extension, University of Arizona

**Norma Ruiz**, B.S., Assistant in Extension, 4-H Youth Development, Santa Cruz County, Cooperative Extension, University of Arizona

**AZ 2080  
March 2024**

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Edward C. Martin, Interim Associate Dean & Director, Extension & Economic Development, Division of Agriculture, Life and Veterinary Sciences, and Cooperative Extension, The University of Arizona. The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information in its programs and activities.

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

# TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>I. PURPOSE OF THE PROJECT GUIDE.....</b>     | <b>01</b> |
| <b>II. CROSS REALITY (XR) FACT SHEET.....</b>   | <b>02</b> |
| <b>III. WHO IS USING AR IN AGRICULTURE?....</b> | <b>03</b> |
| <b>IV. THE FLOATING FARM: AUGMENTED REALITY</b> |           |
| <i>5 Minute AR Activity.....</i>                | <i>05</i> |
| <i>20 Minute AR Activity.....</i>               | <i>12</i> |
| <i>45 Minute AR Activity.....</i>               | <i>19</i> |
| <b>V. WHO IS USING VR IN AGRICULTURE?....</b>   | <b>56</b> |
| <b>VI. THE FLOATING FARM: VIRTUAL REALITY</b>   |           |
| <i>5 Minute VR Activity.....</i>                | <i>30</i> |
| <i>20 Minute VR Activity.....</i>               | <i>32</i> |
| <i>45 Minute VR Activity.....</i>               | <i>38</i> |
| <b>VII. APPENDIX.....</b>                       | <b>47</b> |

# Purpose of the Project Guide

## COMMUNITY OUTREACH

As a part of your 4-H community outreach whether as an ambassador, volunteer, or staff you have the opportunity to go out and interact with schools and families. This will help you in promoting the 4-H program and highlight the benefits of supporting positive youth development in your community.

These lessons are for those new to Augmented Reality and Virtual Reality (AR/VR) technology. Representing the "T" in STEM learning these tools (AR/VR) has many uses and can be found being used by many different kinds of professions!

Because of the broadness, these lessons are to develop a basic understanding of the tools and apply to your identity and see how they function. There are several examples throughout the lessons on how others are using it in their field.

It is encouraged for ambassadors, volunteers, and staff to apply what they have learned from other 4-H activities or personal research into these AR/VR projects.



# CROSS REALITY (XR) FACT SHEET

## What is Augmented Reality?

Augmented reality is a combination of the physical world and virtual (computer-generated) worlds. Some types of augmented reality can use your sight, touch, hearing, or even your sense of smell! The shortened term for augmented reality is "AR".



## What is Virtual Reality?

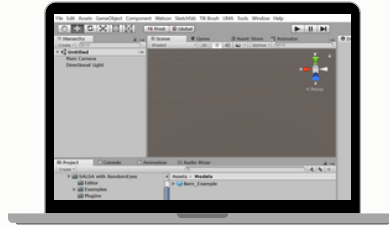
Virtual reality (VR) is a simulated experience that can be similar to or completely different from the real world.

## Difference Between AR and VR



Diagram based on Paul Milgram and Fumio Kishino's Virtuality Continuum

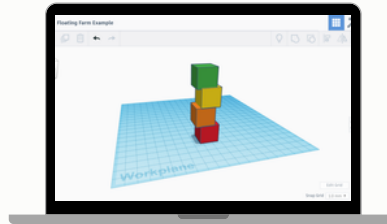
# How Does it Work?



1) Use a program or software to recognize an area/image to place virtual content



2) Obtain your object/marker



3) Upload your virtual content (3D model, 2D model, music, etc.) to that program/software



4) Test your AR project!



## WHO IS USING AR IN AGRICULTURE?

Many different kinds of fields utilize augmented reality technology including (but not limited to) education and K-12 classrooms, military, medicine, the fine arts, farmers and MORE!

Below are a few examples of how AR is being used in Agricultural fields of work.



### NEDAP COWCONTROL

This new technology brings the farmer's real world and digital information together. It enriches his field of view with relevant cow data at the right time and place using Microsoft's HoloLens



### POWERFUL PLANTS

The Powerful Plants by Burpee augmented reality experience provides a fun new way to learn about plants and their importance to the human condition.



### VADERSTAND AR

The technology enables trainees to familiarize themselves with farm machinery without having to operate it in the actual sense.



### FARM AR MOBILE

Created by FarmVR. Place and interact with agricultural 3D models! Use FarmAR to bring the digital farm to your real world using ARKit/ARCore technologies.



### VITAL FARMS

Vital Farms designed an egg carton that can also be used as an AR marker!



### EON XR

Students can now take the front row seat in their own AR/VR classroom, to examine how technology has changed the farming industry over the course of the century.

#### REFERENCES

- Augmented Reality Seed Packets. (n.d.). Retrieved from <https://powerfulplants.net/>
- Apps. (2021, January 29). Retrieved March 01, 2021, from <https://farmvr.com/apps/>
- AR/VR classroom: Technology and agriculture. (2020, December 16). Retrieved March 01, 2021, from <https://eonreality.com/ar-vr-classroom-technology-and-agriculture/>
- Augmented reality. (2020, August 18). Retrieved March 01, 2021, from <https://www.nedap-livestockmanagement.com/dairy-farming/solutions/nedap-cowcontrol/augmented-reality/>
- Mileva, G. (2020, July 30). How augmented reality could revolutionize farming. Retrieved March 01, 2021, from <https://arpost.co/2019/01/18/how-augmented-reality-could-revolutionize-farming/>
- Rick Lingle | May 23. (2020, July 08). Augmented reality app complements egg carton redesign. Retrieved March 01, 2021, from <https://www.packagingdigest.com/packaging-design/augmented-reality-app-complements-egg-carton-redesign>



# 5 MINUTE AR ACTIVITY

Please read the scenario before moving on to the instructions!



5 min

TIME  
LIMIT



25 -100  
PEOPLE



PARENTS  
AND  
CHILDREN

## Playing with AR using Quiver Coloring Pages

LOCATION: TABLING EVENT

LEVEL: PUBLIC (PARENTS AND CHILDREN)

GROUP SIZE: 25-100

TIME LIMIT: 5 MINUTES

In this activity you will be demonstrating what augmented reality is using Quiver coloring pages! Using the Quiver app users will be able to color onto a page and scan their drawing to watch it come to life!





## What is Quiver?

Quiver is a company that specializes with augmented reality coloring pages. You download their app, print out their coloring pages, and combine the two for a fun and great introduction into augmented reality technology by watching the page come to life!

## Activity Instructions

1. Read "Accessing Quiver Coloring Pages"
2. Print out the coloring pages provided (it's okay if it's not in color). It's alright if you have more than needed since these can be reused or taken home by participants
3. Download the Quiver Vision app onto your phone or tablet (it will have a blue butterfly in the app store or apple store)
4. Using the tablet/phone scan each kind of coloring page provided once so the app can download the data needed to pull up the 3D model once you scan future pages

**PLEASE NOTE:** When coloring on the pages be sure users do not color too dark. The app is sensitive and may not be able to properly scan if too many of the dark lines are covered with darker colors. It's alright if the QR codes are colored over or cut off since the app is only looking for the overall picture that is being colored

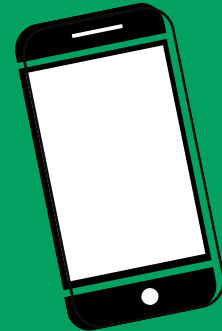
### Augmented Reality

AR iOS is compatible with all ARKit compatible devices running [iOS11](#) including: iPhone SE, iPhone 6s, iPhone 6s Plus, iPhone 7, iPhone 7 Plus, iPhone 8, iPhone X, all iPad Pro models, and iPad (2017).

AR for Android requires Android 7.0 or later and access to the Google Play Store. A full list of compatible devices can be found on the [ARCore developer website](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

## Required materials



- 1) A cellphone or tablet to present AR material



- 2) Download the Quiver app\*

\*As of 2022 Quiver is now on a paid subscription plan. But you can get a FREE 7 day trial:

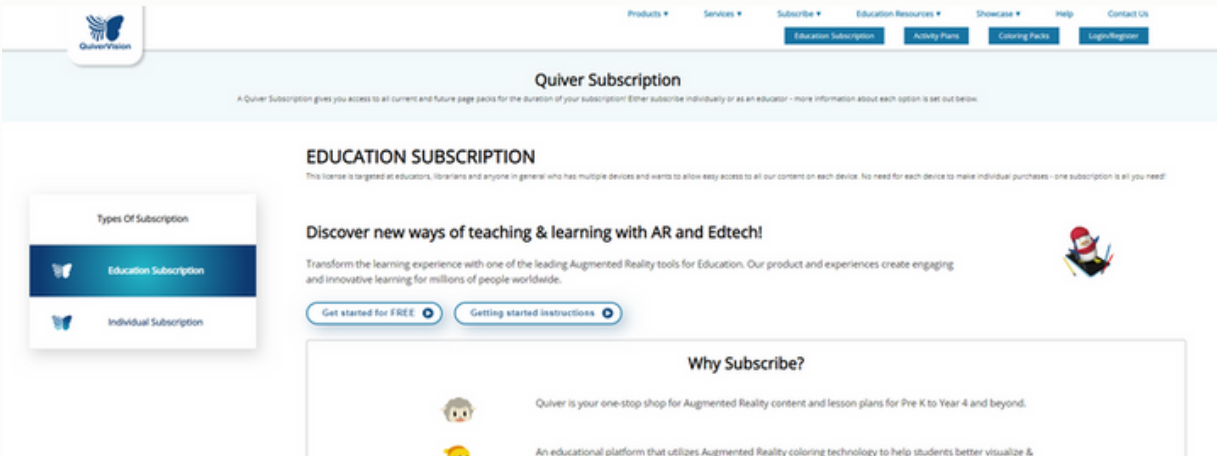
<https://quivervision.com/subscribe/education>



If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!

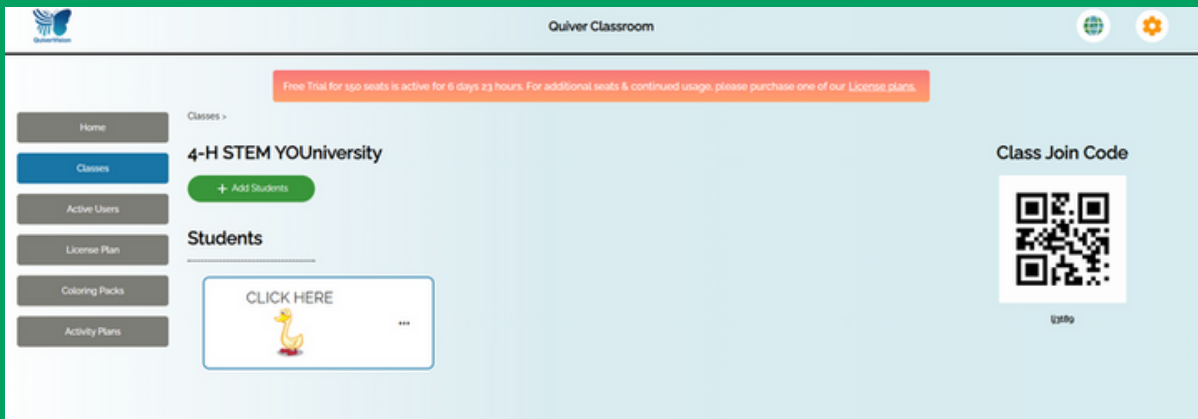
# Accessing Quiver Coloring Pages

You will be redirected to a page that looks like this



<https://quivervision.com/subscribe/education>

Quiver has updated their app and you now need a subscription to use the AR coloring pages. You can create an account and access their 7-day free trial.



The duck icon and the Class Join Code are listed here as an example of what you need to experience the AR coloring pages.



THE UNIVERSITY OF ARIZONA  
Cooperative Extension



4-H STEM YOU University  
Ambassador  
Project



QuiverVision.com  
1 Print 2 Color 3 Play




---

|                          |       |                          |       |
|--------------------------|-------|--------------------------|-------|
| <input type="checkbox"/> | _____ | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> | _____ | <input type="checkbox"/> | _____ |
| <input type="checkbox"/> | _____ | <input type="checkbox"/> | _____ |



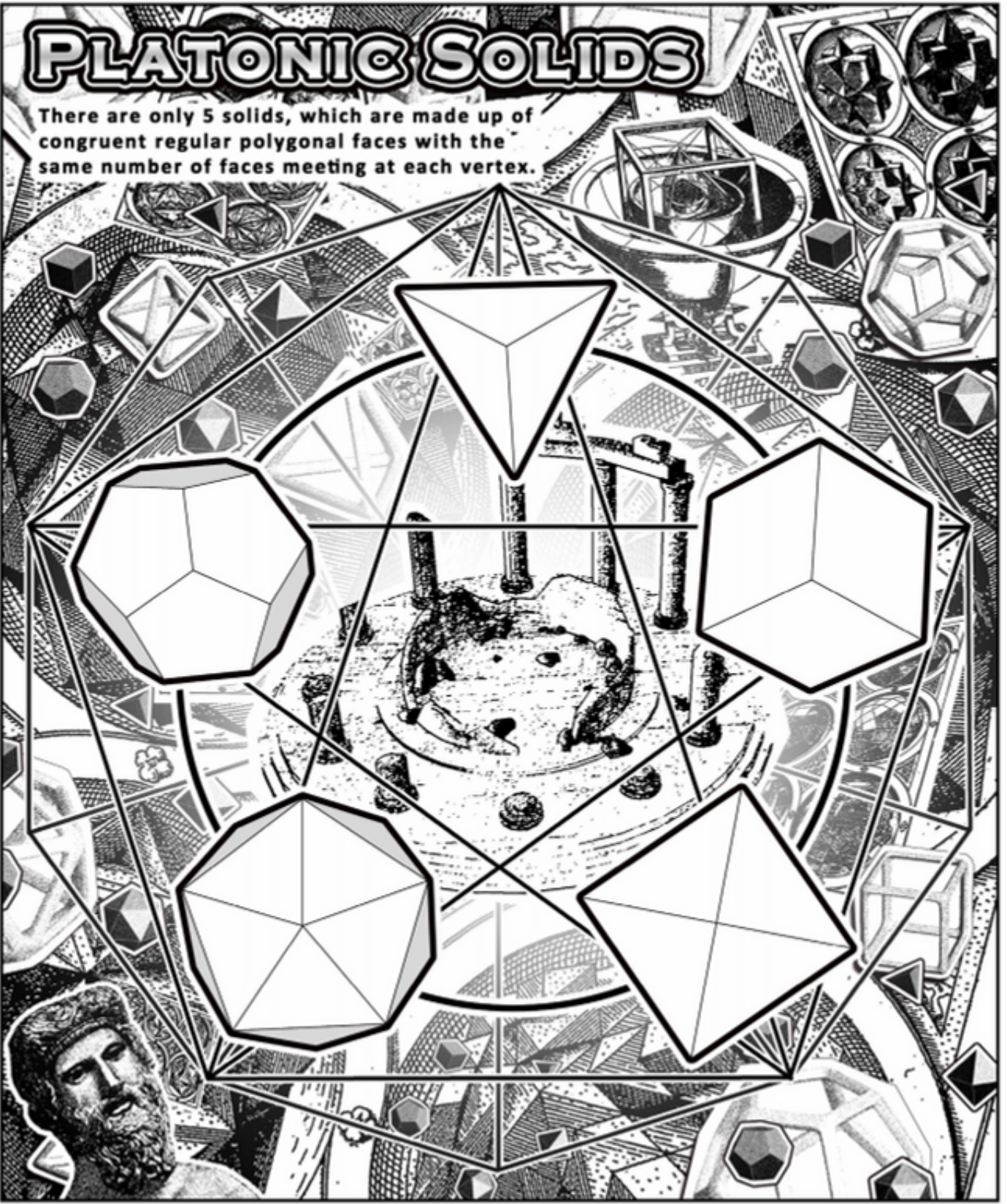
THE UNIVERSITY OF ARIZONA  
Cooperative Extension



4-H STEM YOU University  
Ambassador  
Project



QuiverVision.com  
1 Print 2 Color 3 Play



# PLATONIC SOLIDS

There are only 5 solids, which are made up of congruent regular polygonal faces with the same number of faces meeting at each vertex.



THE UNIVERSITY OF ARIZONA  
Cooperative Extension



4-H STEM YOUiversity  
Ambassador  
Project



QuiverVision.com  
1 Print 2 Color 3 Play



Name: \_\_\_\_\_

Cell Nucleus

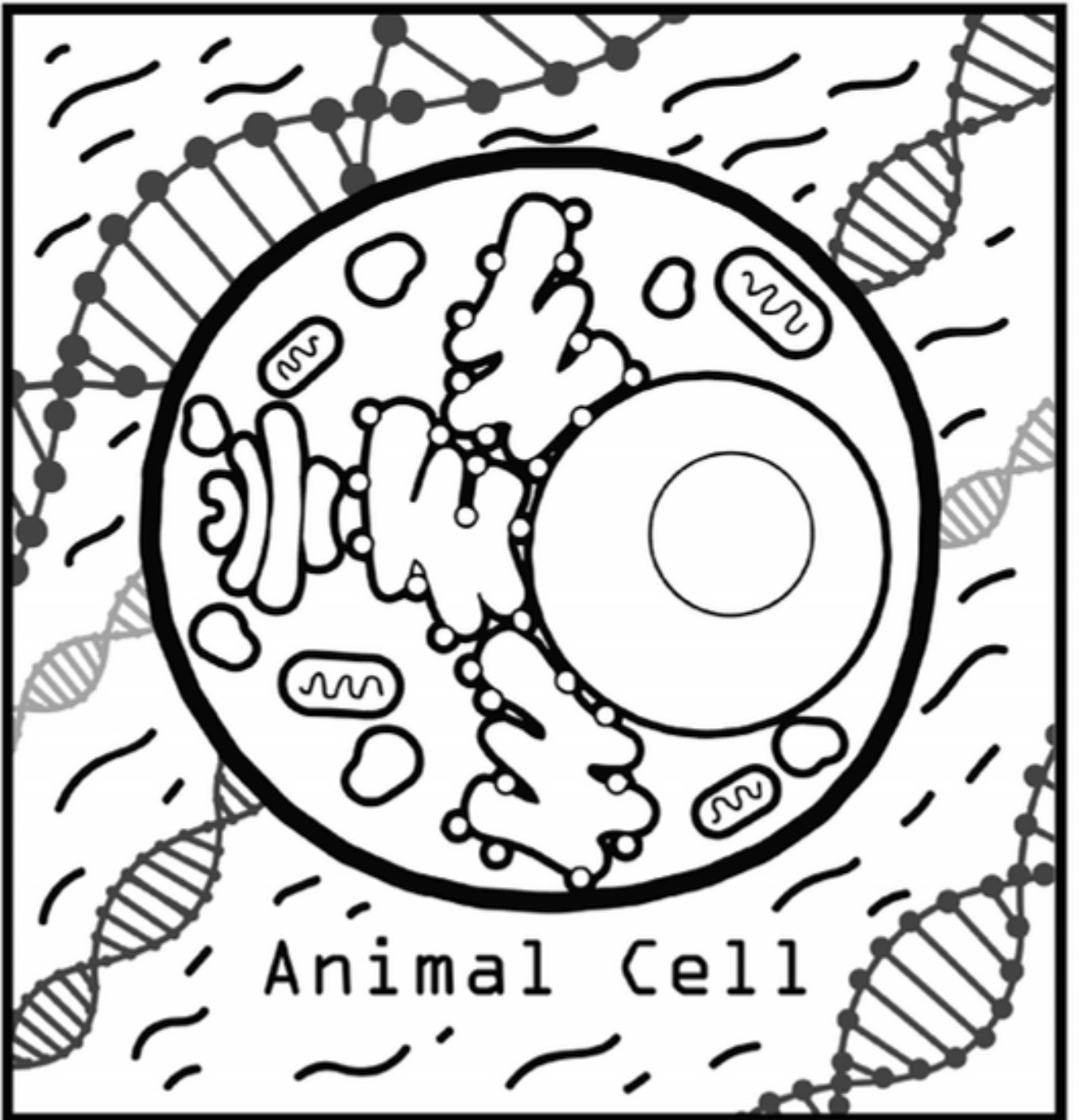
Lysosome

Cell Membrane

Golgi apparatus

Ribosome

Mitochondrion





# 20 MINUTE AR ACTIVITY

Please read the scenario before moving on to the instructions!



## Augmented Reality using Sketchfab



**20 min**

**TIME  
LIMIT**



**10-15  
PEOPLE**



**MIDDLE SCHOOL**

**LOCATION: SCHOOL CLASSROOM**

**LEVEL: MIDDLE SCHOOL**

**GROUP SIZE: 10-15**

**TIME LIMIT: 20 MINUTES**

Using the Sketchfab app (a 3D model presentation website) you will present examples of Augmented Reality scenes by creating a playlist of 3D models that relate to your interests/work or by demonstrating examples using a pre-made list from the 4-H STEM Youniversity Sketchfab account.

You will be able to show others how to explore and navigate the Sketchfab app.



## What is Sketchfab?

Sketchfab is a platform to publish, share, discover, buy and sell 3D, VR and AR content.

## Activity Instructions

1. Complete the Roundtable activity
2. Create an account on to the Sketchfab website to create your own playlist, or use the STEM YOUiversity's pre-made model playlists
3. Complete the **Playlist Creation Exercise** to formulate what kinds of models to look for when creating your playlist
4. Create a playlist of 3D models to present your interests/ career ambitions in 4-H projects
5. Test out the 3D models you saved to your playlist in an Augmented Reality space (for iOS/Apple devices **ONLY**)

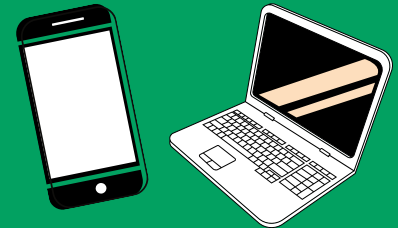
### Augmented Reality

AR iOS is compatible with all ARKit compatible devices running [iOS11](#) including: iPhone SE, iPhone 6s, iPhone 6s Plus, iPhone 7, iPhone 7 Plus, iPhone 8, iPhone X, all iPad Pro models, and iPad (2017).

AR for Android requires Android 7.0 or later and access to the Google Play Store. A full list of compatible devices can be found on the [ARCore developer website](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

## Required materials



- 1) An iOS cellphone or tablet to present AR material
- 2) A laptop to access Sketchfab computer site



- 2) Create a Sketchfab account to save models to a list

<https://sketchfab.com>



If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!



# Roundtable Activity

**Ice Breaker: Have your students take 5-10 minutes to search for augmented reality that pertains to their identity/interests. These links are a few examples to get started!**

**If you cannot find examples that fit with yourself or your interests, describe what kind of tool or app you'd like to see or make yourself.**

**MY NAME IS** \_\_\_\_\_

**I IDENTIFY AS** \_\_\_\_\_

**I COME FROM** \_\_\_\_\_

**I GREW UP WITH** \_\_\_\_\_

**MY HOBBIES INCLUDE** \_\_\_\_\_

**SOMETHING I WOULD LIKE TO LEARN** \_\_\_\_\_

**SOMETHING I HAVE GREAT SKILL IN** \_\_\_\_\_

**Tucson's Bonita Park AR (2023)**

**Meet 3 Latinas Leading in Virtual and Augmented Reality**

**Preserving The Art Of Black Lives Matter Using AR**

**Highlighting the Resilience of Indigenous People Through Augmented Reality (Haudenosaunee nations)**

**Once you have found some examples go around the room and share.**

## References

"Discovering My Identity." Learning for Justice, [www.learningforjustice.org/classroom-resources/lessons/discovering-my-identity](http://www.learningforjustice.org/classroom-resources/lessons/discovering-my-identity). Accessed 5 Sept. 2023.

Gay, G. M. (2023, August 31). This UA-driven project is bringing Tucson history to life through augmented reality. KGUN 9 Tucson News. <https://www.kgun9.com/news/local-news/this-ua-driven-project-is-bringing-tucson-history-to-life-through-augmented-reality>

Virtual reality immerses users into once unreachable worlds. (2016, November 2). [Video]. NBC News. <https://www.nbcnews.com/news/latino/meet-3-latinas-leading-virtual-augmented-reality-n656361>

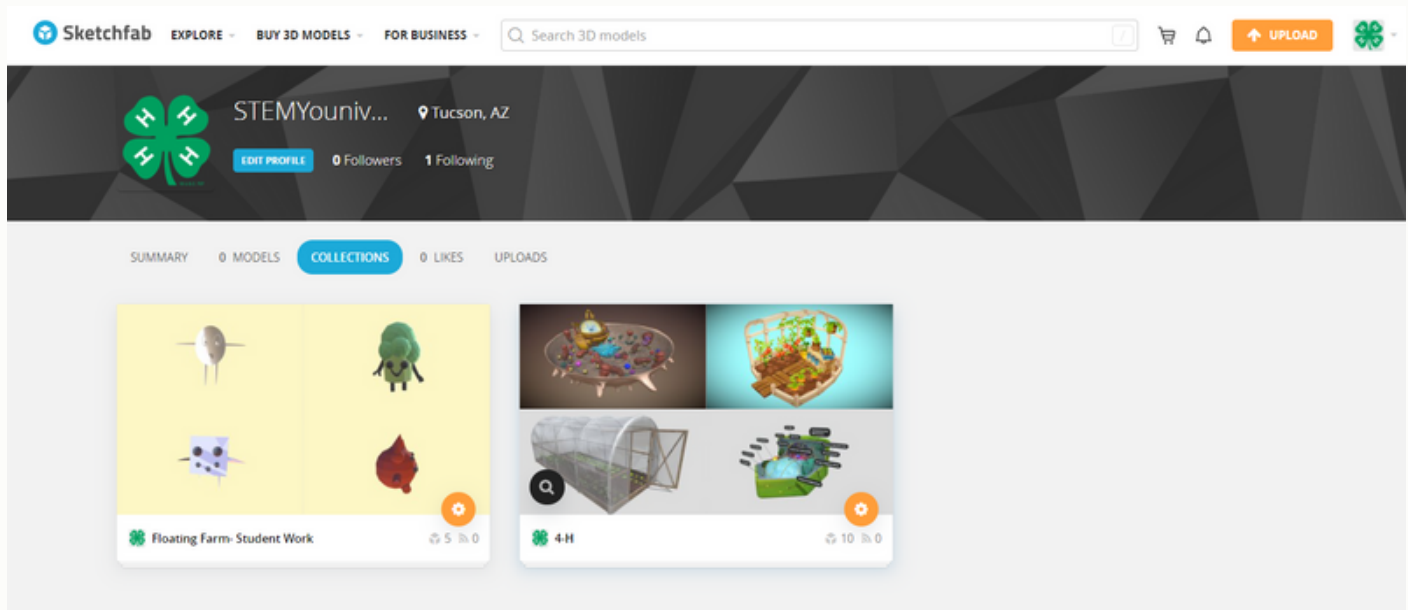
Writer, F. (2020, August 15). Preserving The Art Of Black Lives Matter Using AR - VRScout. VRScout. <https://vrscout.com/news/preverving-the-art-of-blm-in-ar/>

Rina, A., & Rina, A. (2019). Highlighting the resilience of Indigenous people through augmented reality. Hyperallergic. <https://hyperallergic.com/530443/highlighting-the-resilience-of-indigenous-people-through-augmented-reality/>

# Step 1: Logging in to Sketchfab

If you are going to be creating your own playlist and not using one of the pre-made ones in the STEM YOUiversity account create your own profile and skip to **Step #2: Playlist Creation Exercise**. If you would like to use a pre-made playlist continue to the instructions below

1. Go to the 4-H STEM YOUiversity Sketchfab account at [https://sketchfab.com/STEM\\_YOUiversity](https://sketchfab.com/STEM_YOUiversity).
2. On the left-hand side, click on the Collections tab. Here you will find the different playlists saved. Skip ahead to **Step 4: Trying out the Sketchfab app**



# Step 2: Playlist Creation Exercise

Please write a few sentences for the following

1. What other 4-H projects are you working on? Do you have any interests or skills that you would like to share with the community? How can these be demonstrated through 3D models?

---

---

---

---

2. List your interests and skills as single words (These will be used to look up 3D models later on)

---

---

---

**Please write a few sentences for the following**

1. List your interests and skills as single words. The reason for this is the Sketchfab search engine (when you are looking up models) tends to bring up more variety if you keep the words placed into the search engine short. Single words bring up the most options in models.

---

---

---

2. What other 4-H projects are you working on? Do you have any interests or skills that you would like to share with the community? How can these be demonstrated through 3D models?

---

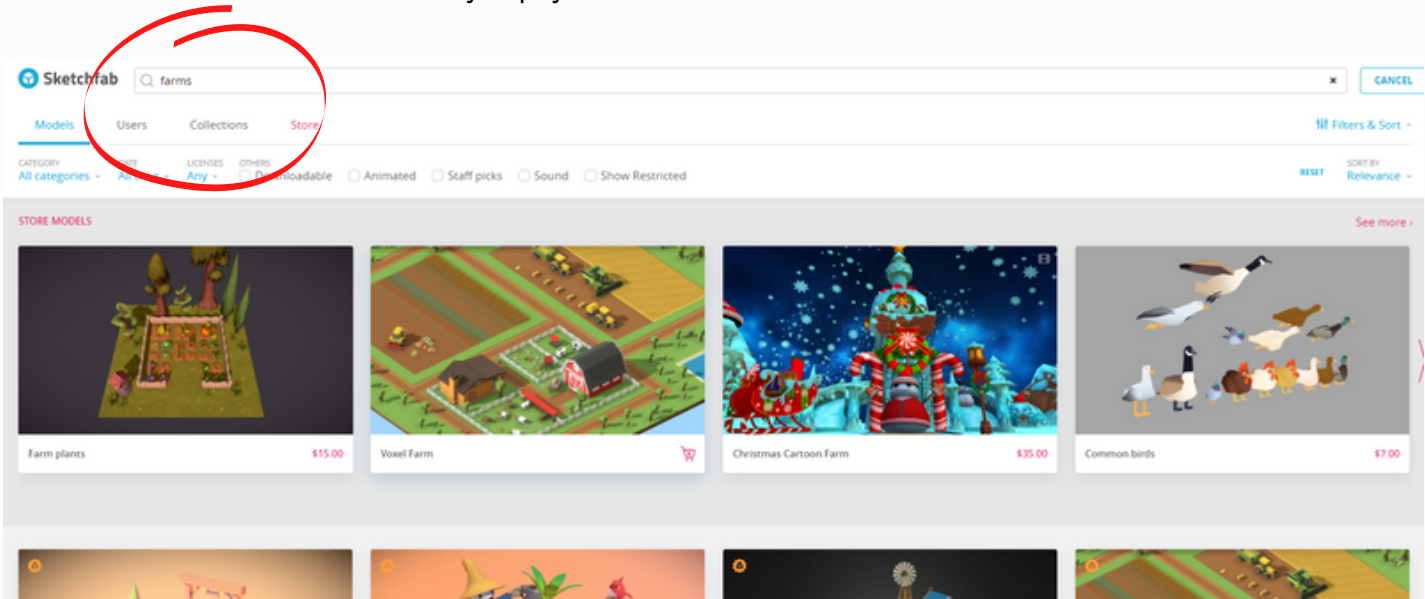
---

---

---

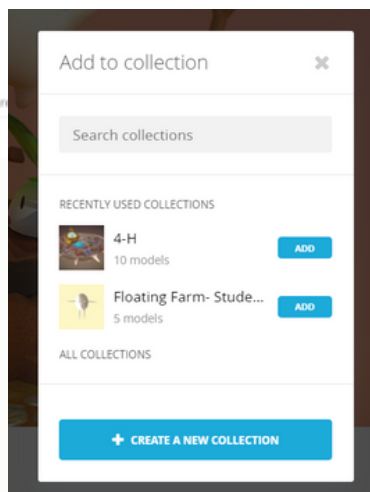
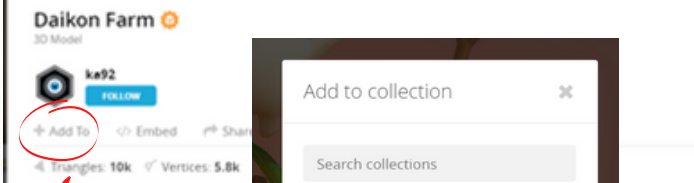
# Step 3: Creating a playlist of 3D models

After coming up with a few different ideas for models from the exercise, use the search bar at the top of the Sketchfab website to find models to add to your playlist



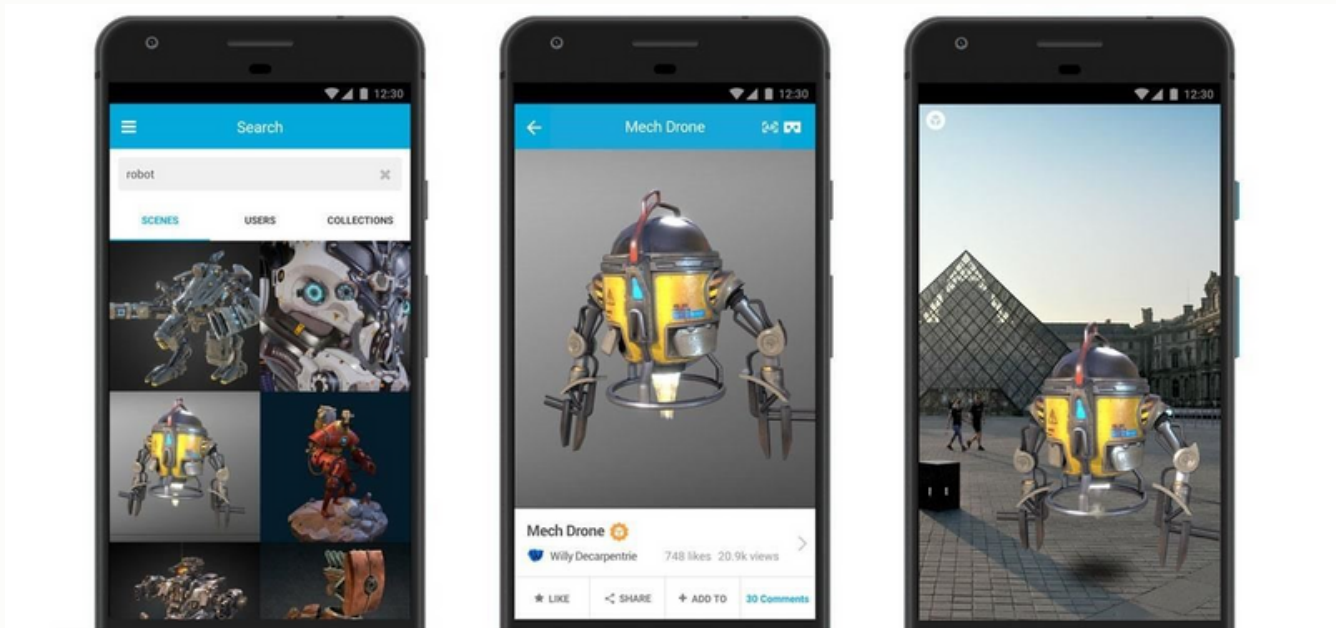
To add a model to a playlist to view later, click on the image and go to the lower left-hand corner to "Add to"

From there, a window will pop up. You can add to your current collection or you can create a brand new collection.

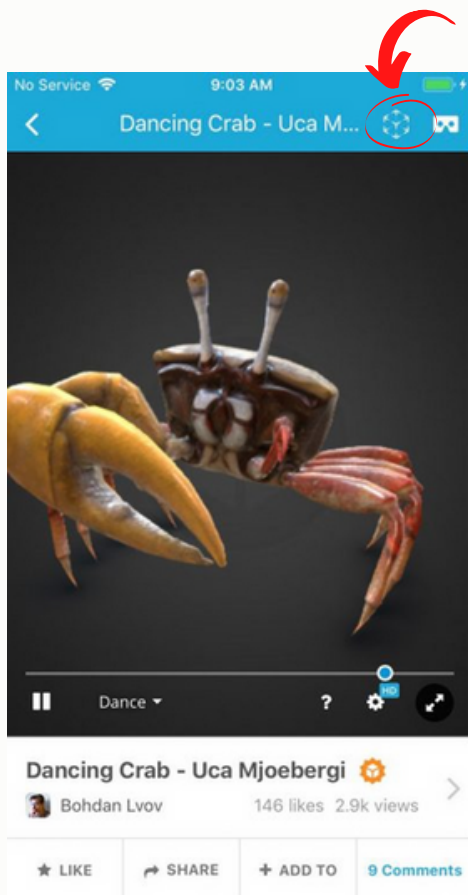


Repeat these steps until you have around 5-10 models in your playlist to view.

## Step 4: Trying out the AR features



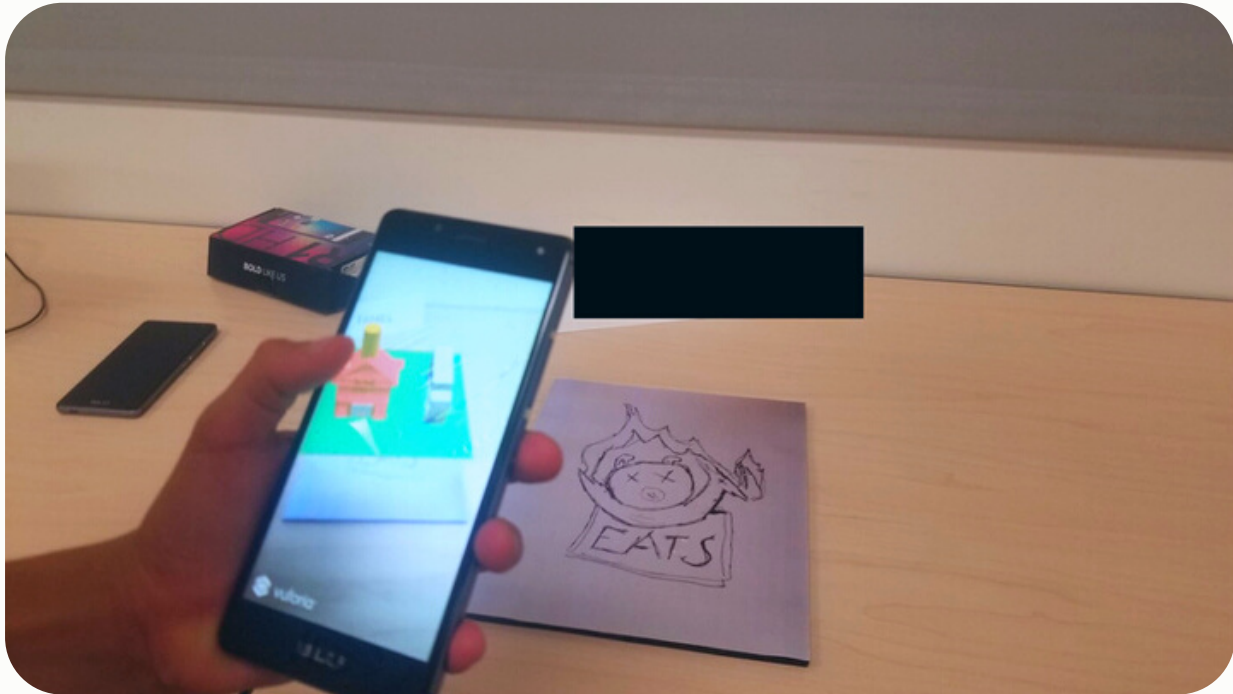
To present an item as an AR object, select the cube in the app in the upper right-hand corner and scan a surface to place the model on top! **PLEASE NOTE this can only be done with iOS devices (apple products).**





# 45 MINUTE AR ACTIVITY

Please read the scenario before moving on to the instructions!



TIME  
LIMIT



25 PEOPLE



MIDDLE SCHOOL  
OR  
UPPER ELEMENTARY

## Creating an AR Scene Using Sketchfab and Tinkercad

LOCATION: SCHOOL CLASSROOM

LEVEL: MIDDLE SCHOOL OR UPPER ELEMENTARY

GROUP SIZE: 25

TIME LIMIT: 45 MINUTES

Using the online software Tinkercad you will create an original 3D model to then upload to the Sketchfab website (a 3D model presentation website) to then present on Sketchfab.

This activity is to show how to create 3D models and showcase them online as an augmented reality scene through Sketchfab.



#### What is Sketchfab?

Sketchfab is a platform to publish, share, discover, buy and sell 3D, VR and AR content.

#### What is Tinkercad?

Tinkercad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use.

## Activity Instructions

1. Create a Tinkercad account
2. Complete the [Designing a 3D model worksheet](#)
3. Creating your 3D model in Tinkercad
4. Downloading your 3D model
5. Creating a Sketchfab account
6. Uploading your 3D model (as a GLTF)
7. Preparing your 3D scene
8. Present 3D model in Sketchfab (AR for iOS **only**)

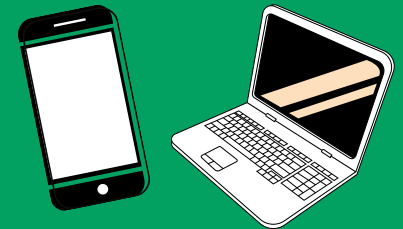
#### Augmented Reality

AR iOS is compatible with all ARKit compatible devices running [iOS11](#) including: iPhone SE, iPhone 6s, iPhone 6s Plus, iPhone 7, iPhone 7 Plus, iPhone 8, iPhone X, all iPad Pro models, and iPad (2017).

AR for Android requires Android 7.0 or later and access to the Google Play Store. A full list of compatible devices can be found on the [ARCore developer website](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

### Required materials



- 1) An iOS cellphone or tablet to present AR material
- 2) A laptop to access Sketchfab computer site



- 2) Create a Sketchfab account  
<https://sketchfab.com>



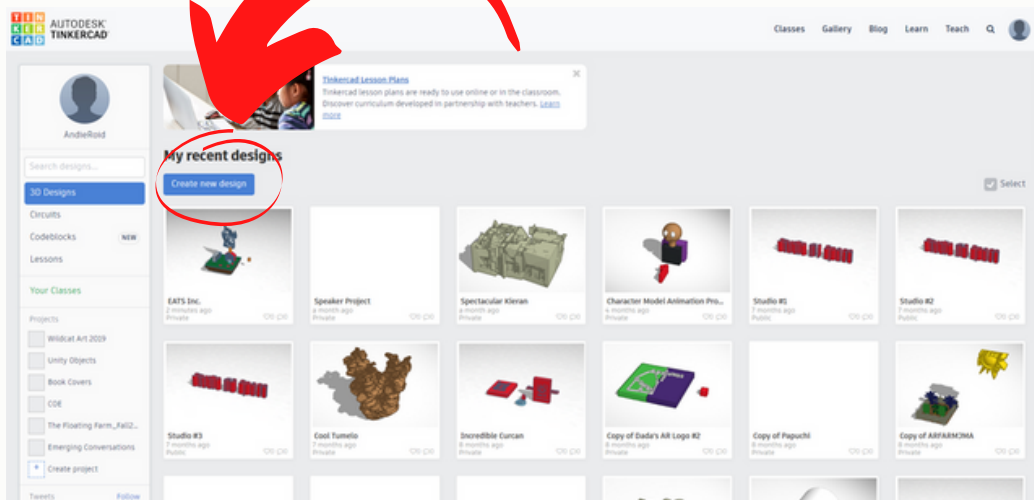
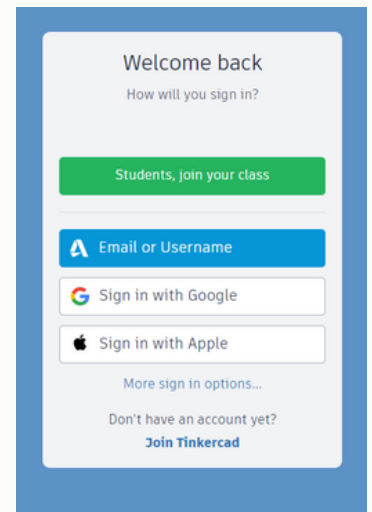
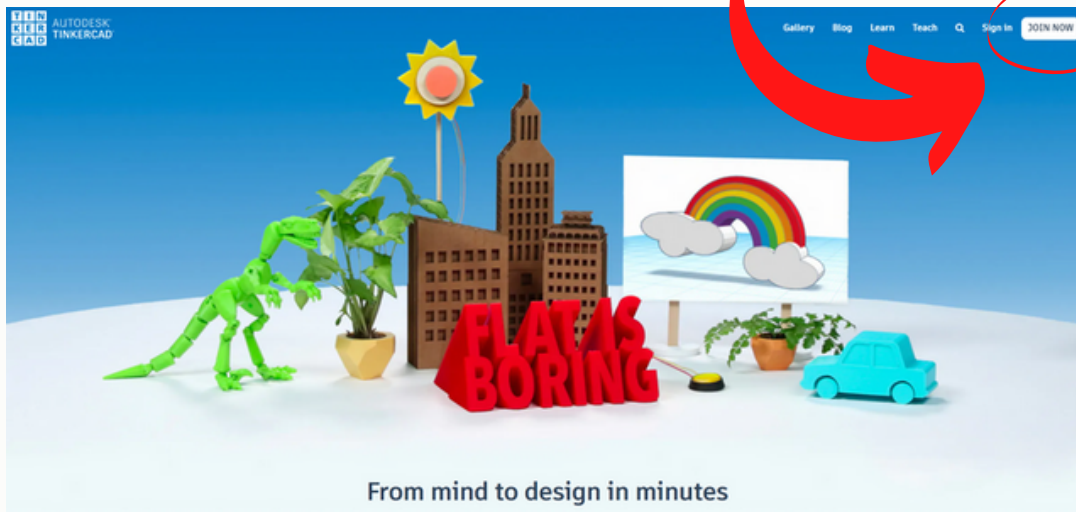
- 3) Create a Tinkercad account  
<https://www.tinkercad.com>



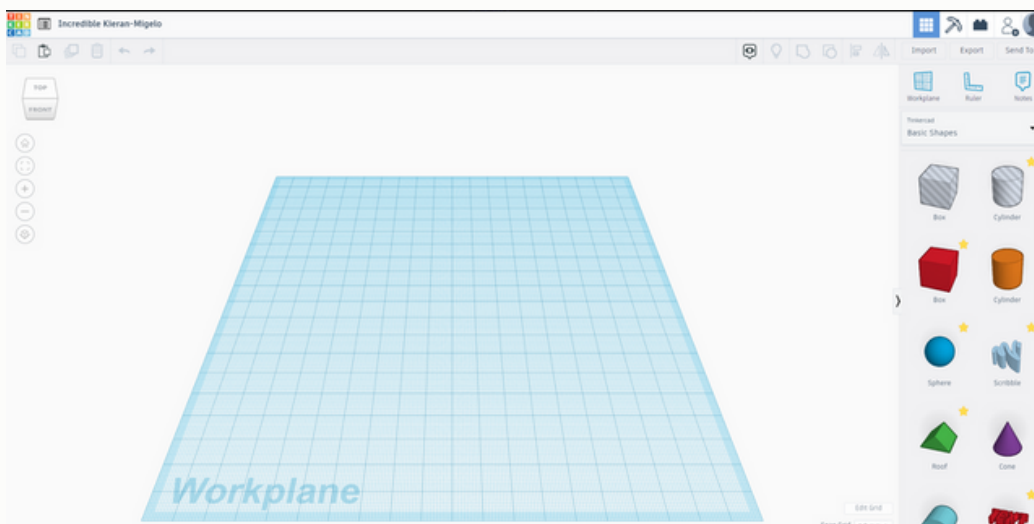
If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!

# Step 1: Create a Tinkercad Account

Go to the Tinkercad website and create an account (Note: white button upper right-hand corner of the screen).  
Create an account with an email account.



Once you have logged in to your Tinkercad account, on the right-hand side click on the "Create New Design" button to begin creating a 3D model



When you start a new project it should look like this.

Before you can start building your 3D model you need to sketch out a plan on how to build it!



## Step 2: Designing a 3D Model Worksheet

What would you like to create a 3D model of? Try to keep your design simple, you can always come back to it later!



# Step 3: Creating your 3D Model in Tinkercad

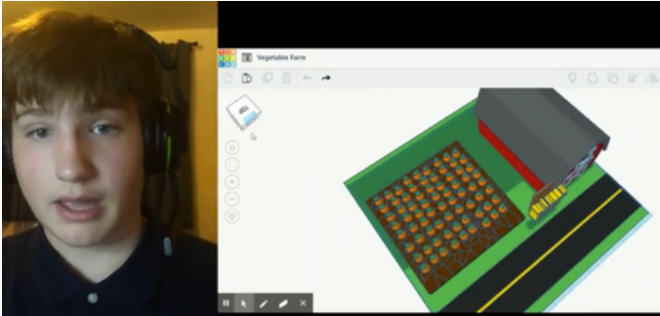


Image: Example of STEM Ambassador's work in Tinkercad

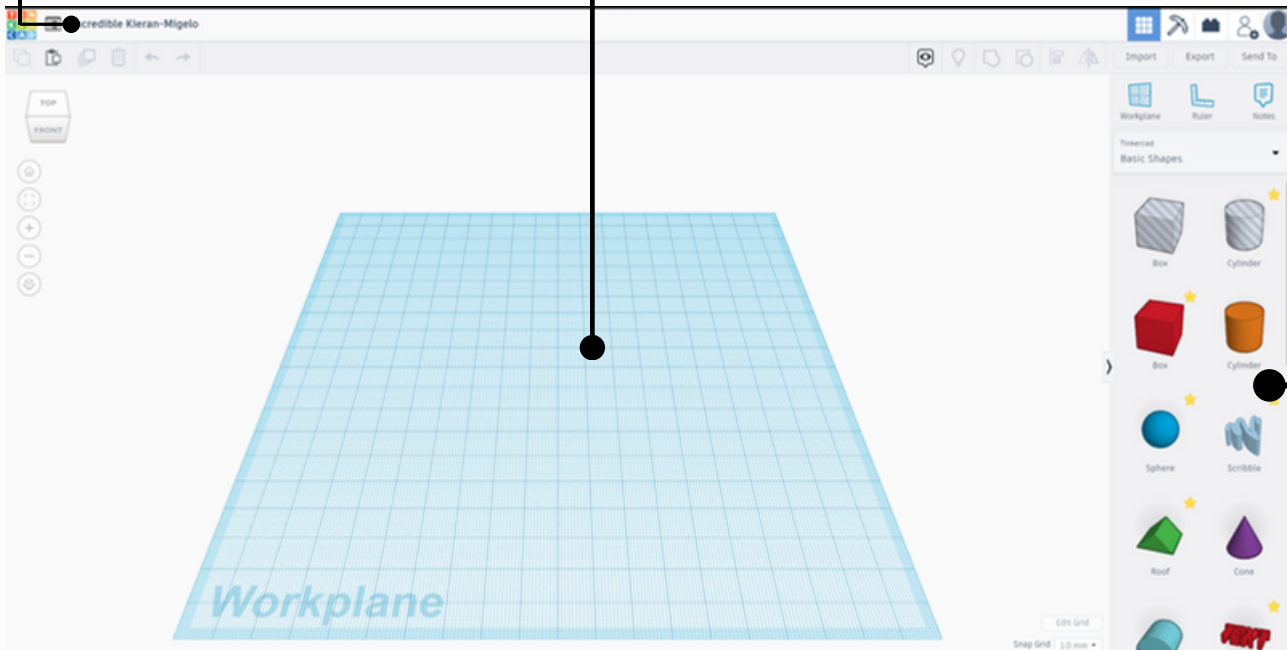
Below is a brief coverage of what the software allows you to do. You can make your model as simple or complex as you'd like!

That being said you do not need to create everything from scratch. However it is a good note of practice to give credit if you are using models made by others.

Here, you can change the name of your model

Main workspace. You can drag items from the right-hand side here to begin building your 3D model

Here you can choose from a wide variety of shapes and pre-made 3D models to come up with your own creations. You can even save your own designs to use as pre-made materials later!



## Step 4: Downloading your 3D Model

Once you are finished creating your 3D model go to the upper right-hand corner and select the "Export" button. Select the GLTF (.glb) option. This is so when you upload the 3D model to Sketchfab the model keeps it's color!

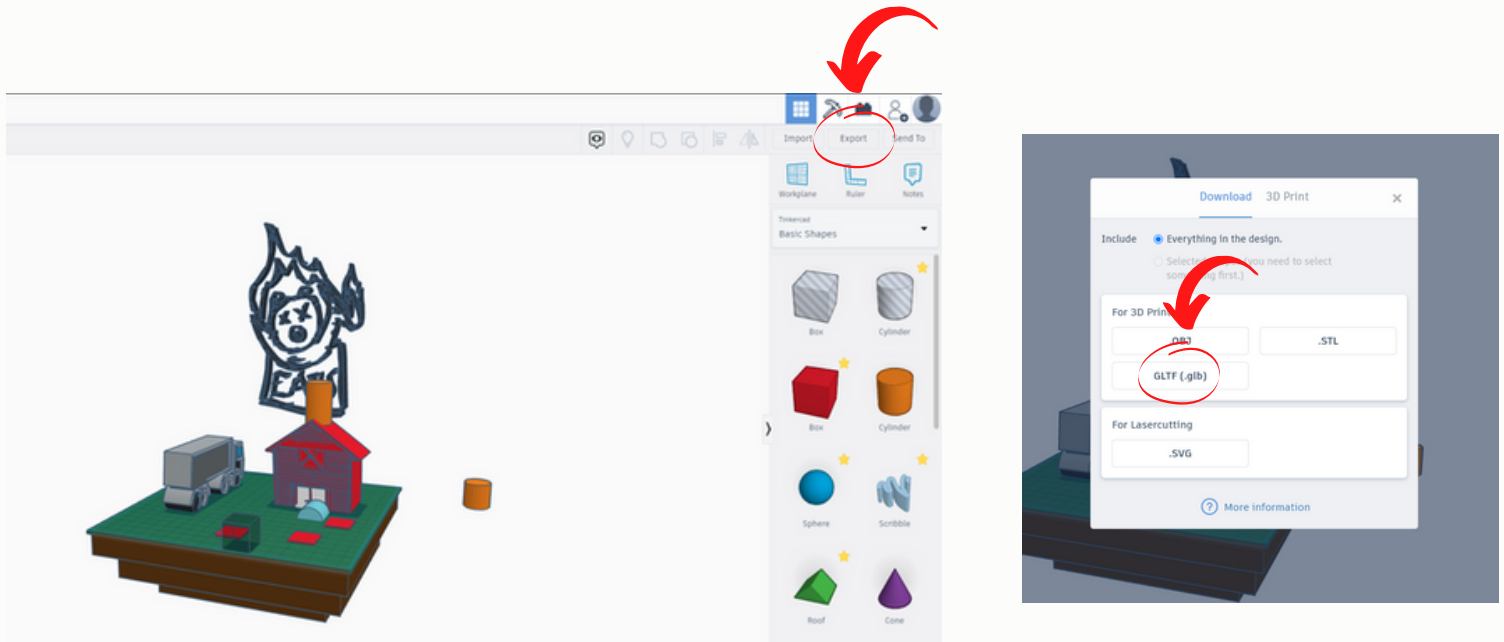


Image: Example of STEM Ambassador's work in Tinkercad

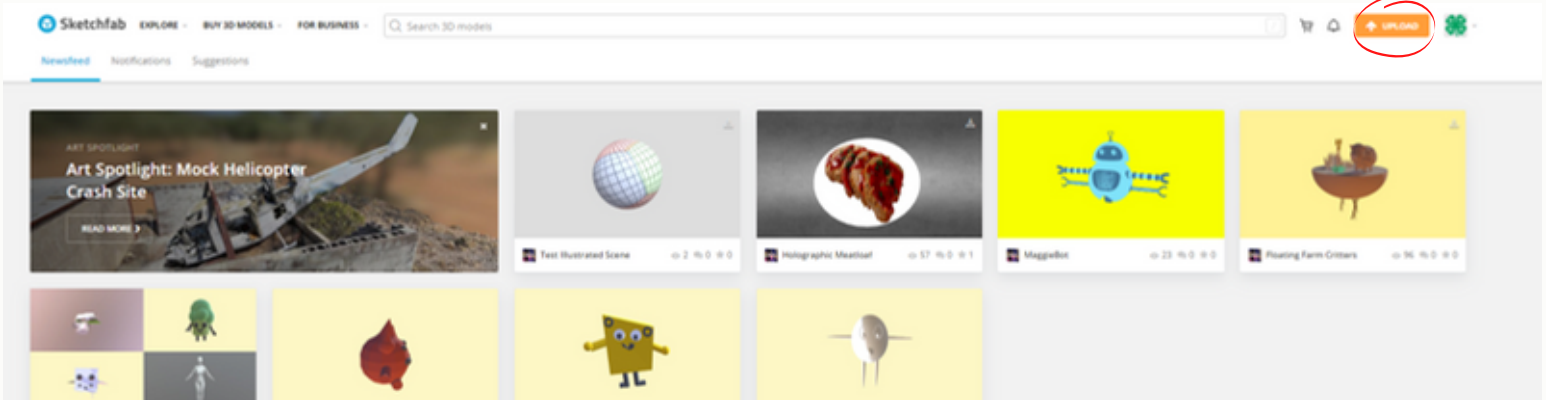
## Step 5: Creating a Sketchfab account

Log into the Sketchfab website and create an account. This is so you can save 3D models and download models.

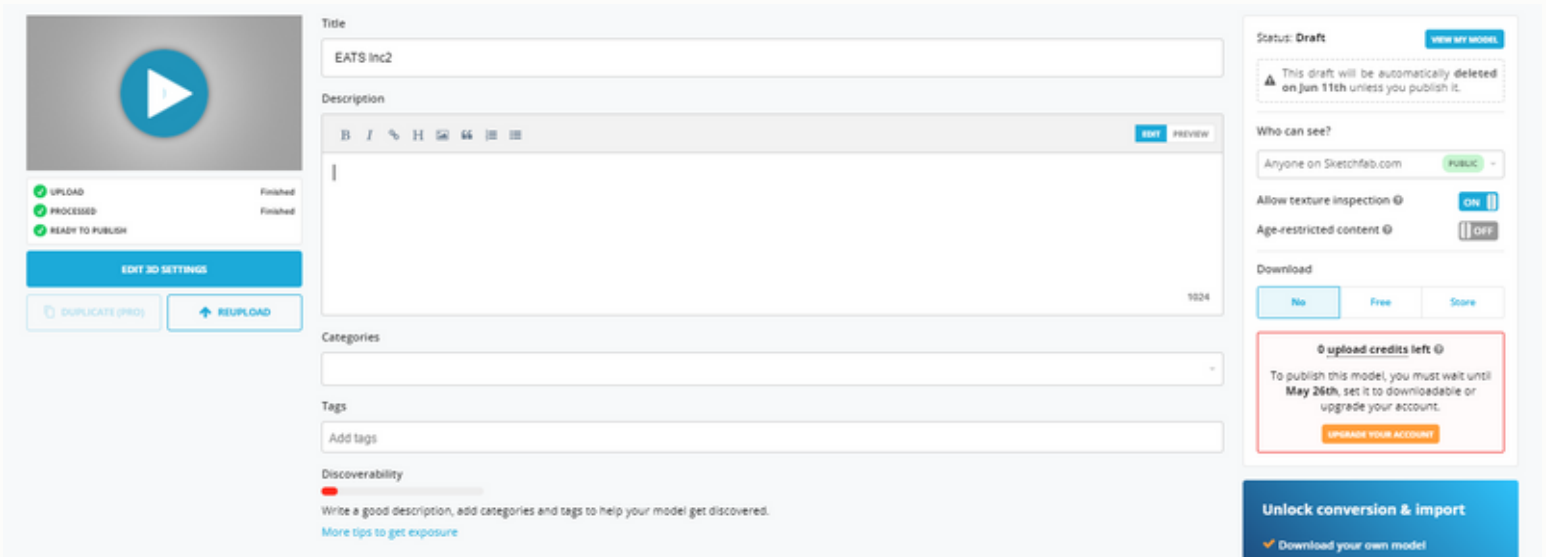


# Step 6: Uploading your 3D Model

Once you have logged in to your Sketchfab account, go to the "Upload" button in the upper-right hand corner.



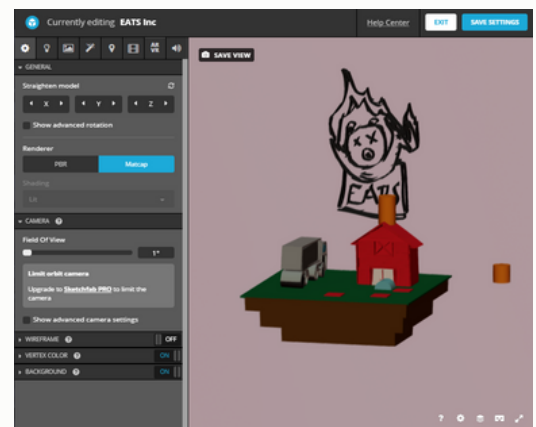
Select the GLTF (.gltf) model you downloaded from the Tinkercad website. Once the upload begins, you can fill out the "Title" and the "Description".



# Step 7: Preparing your 3D Scene

Before testing out your scene you will want to add any wanted sound effects, lighting, and fix the color on the model.

PLEASE NOTE: Sketchfab does have certain features reserved for a paid subscription



Let's begin in the main settings. Make sure you have selected the gear icon to get there. We will be setting up the color, background, and getting the color back onto the 3D model.



### GENERAL SETTINGS

Select "Matcap". Matcap stands for "material capture" and is an image that is used as an image texture to fake a whole material including lighting and reflections in 3D applications.



### VERTEX COLOR

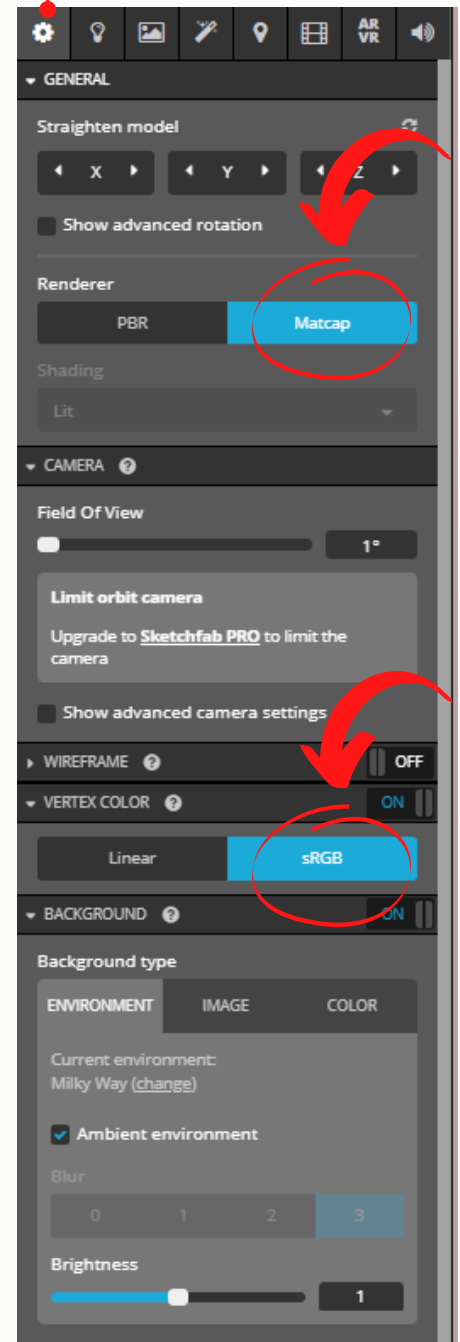
Here, selecting sRGB allows for the original colors of the model from Tinkercad to show.



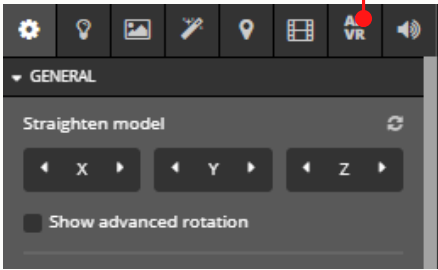
### BACKGROUND

Here, you can select your background color, or choose an "Ambient Environment" to select a more interesting lighting setup.

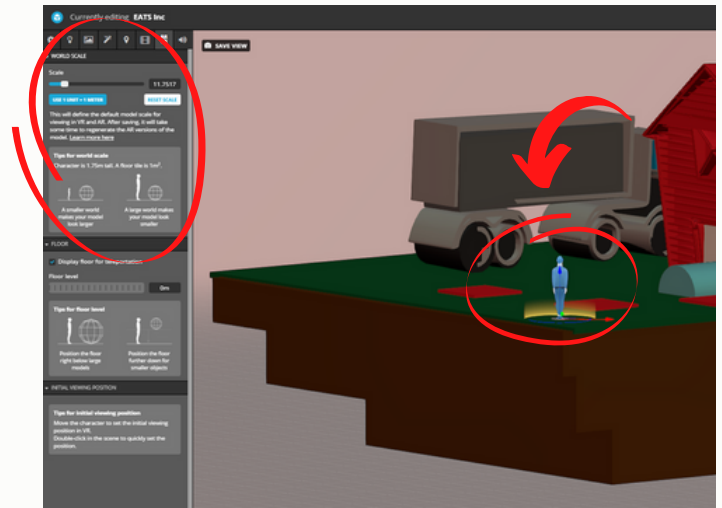
Main Settings Tab



AR/VR Tab

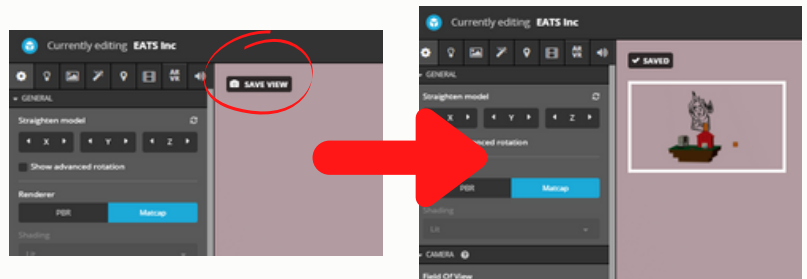


Next, you will select the AR/VR tab to manage the size of your scene when you view it on the Sketchfab app in AR/VR mode



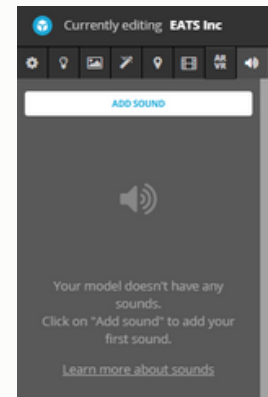
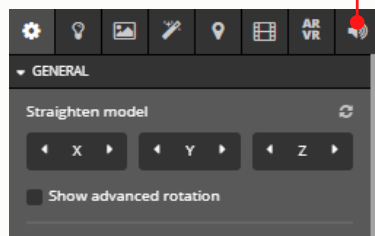
Once you have finished setting the scale and lighting you can save a screenshot of your model using the "Save View" button.

This is how your model will appear when others look for it/ how it will be previewed on your profile.



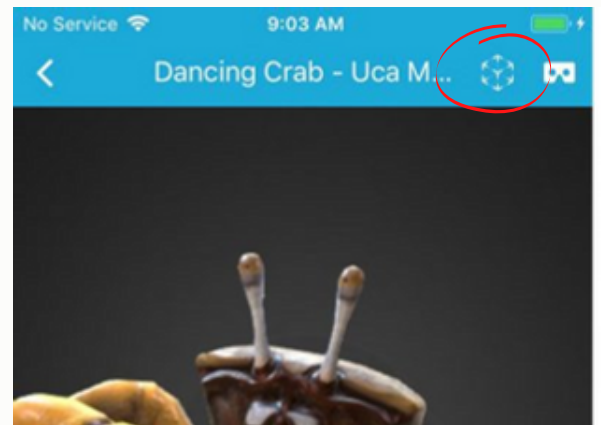
Sound Effect Tab

If you would like to add sound to your scene you can select the "Sound Effect" tab and upload your file.



## Step 8: Present 3D Model in Sketchfab

- Log into your profile on Sketchfab
- Select your model and click on the AR button (transparent cube icon)  
**PLEASE NOTE THIS IS ONLY FOR IOS DEVICES**
- Enjoy!





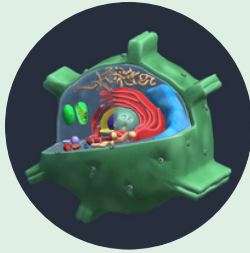
# The Floating Farm: Virtual Reality

Activities

## WHO IS USING VR IN AGRICULTURE?

Many different kinds of fields utilize augmented reality technology including (but not limited to) education and K-12 classrooms, military, medicine, the fine arts, farmers and MORE!

Below are a few examples of how VR is being used in Agricultural fields of work.



### CELLULAR FOR MERGE CUBE

Learn about cells and organelles with a 3D model that you can place anywhere!



### CO-SPACES

Easily build VR and AR spaces with kid-friendly creation tools



### HARVEST SIMULATOR VR

Work in your own virtual reality farm, where you can use your farming tools and your skills to create the best farm possible.



### FARM VR MOBILE

Immerse yourself in our collection of exciting and educational virtual reality farming experiences! FarmVR is a realistic VR farming simulator.



### FORESTRY VR 360

The soil and climate provide the perfect setting for seed orchard farms like the one in this video. The goal of seed orchards is to produce large quantities of seed for seedling nursery operations.



### YOUTUBE 360 VIDEOS

Youtube has several 360 video tours. For example, the channel Farm & Food Care shows a 360 grain farm tour:

<https://www.youtube.com/watch?v=FyF6RW0vY7I>

#### REFERENCES

- Nelson, H. F. (2019, January 27). Cellular for MERGE CUBE. App Store. <https://apps.apple.com/us/app/cellular-for-merge-cube/id1408767673>.
- CoSpaces edu for Kid-friendly 3D creation and coding. CoSpaces Edu for kid-friendly 3D creation and coding. (n.d.). <https://cospaces.io/edu/>.
- Harvest simulator VR on Steam. Harvest Simulator VR on Steam. (n.d.). [https://store.steampowered.com/app/612030/Harvest\\_Simulator\\_VR/](https://store.steampowered.com/app/612030/Harvest_Simulator_VR/).
- Google. (n.d.). Farmvr - virtual reality farming experiences - apps on google play. Google. [https://play.google.com/store/apps/details?id=com.thinkdigital.farmvr&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=com.thinkdigital.farmvr&hl=en_US&gl=US).
- YouTube. (2019, September 10). 360 view shows how trees are Planted | Forestry VR 360. YouTube. <https://www.youtube.com/watch?v=hno6MjtWAMw>.
- YouTube. (n.d.). Youtube. <https://www.youtube.com/>.





# 5 MINUTE VR ACTIVITY

Please read the scenario before moving on to the instructions!



**5 min**

**TIME  
LIMIT**



**25 -100  
PEOPLE**



**PARENTS  
AND  
CHILDREN**

## Virtual Reality using FarmVR

**LOCATION: TABLING EVENT**

**LEVEL: PUBLIC (PARENTS AND CHILDREN)**

**GROUP SIZE: 25-100**

**TIME LIMIT: 5 MINUTES**

In this activity you will be using the app FarmVR to showcase virtual reality videos. Users will be able to learn about VR and it's uses in agriculture.



### What is FarmVR?

An immersive technology studio, working with virtual reality in agriculture, as well as augmented reality (VR & AR). Based in Adelaide, Australia.

## Activity Instructions

1. Download the **FarmVR** app onto your cellphone
2. Open the FarmVR app
3. Choose one of the videos
4. Place phone into the XR headset after starting a video to experience the scene. If you don't see the dual screens try clicking on the settings "gear" located in the upper right-hand corner of the screen Repeat steps 3-4 per guest or have a user choose different videos at a time.

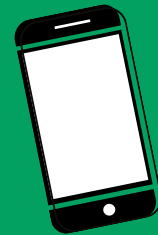
#### Virtual Reality (on mobile)

VR is compatible with [Google Cardboard](#) viewers and other cardboard compatible devices including clip-on style VR glasses like [Homido Mini](#), as well as the Samsung Gear VR and Oculus Go.

Samsung Gear VR supports: [Galaxy S6](#), [Galaxy S6 Edge](#), [Galaxy S6 Edge+](#), [Samsung Galaxy Note 5](#), [Galaxy S7](#), [Galaxy S7 Edge](#), [Galaxy S8](#), [Galaxy S8+](#), [Samsung Galaxy Note Fan Edition](#), [Samsung Galaxy Note 8](#), [Samsung Galaxy A8/A8+ \(2018\)](#) and [Samsung Galaxy S9/Galaxy S9+](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

### Required materials



- 1) A cellphone
- 2) A XR headset (with cutout space for phone camera) to present VR material



- 3) Download the FarmVR app

<https://farmvr.com>



If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!



# 20 MINUTE VR ACTIVITY

Please read the scenario before moving on to the instructions!



## Virtual Reality using Sketchfab



20 min

TIME  
LIMIT



10-15  
PEOPLE



MIDDLE SCHOOL

**LOCATION: SCHOOL CLASSROOM**

**LEVEL: MIDDLE SCHOOL**

**GROUP SIZE: 10-15**

**TIME LIMIT: 20 MINUTES**

Using the Sketchfab app (a 3D model presentation website) you will present examples of Virtual Reality scenes by creating a playlist of 3D models that relate to your interests/work or by demonstrating examples using a pre-made list from the 4-H STEM Youniversity Sketchfab account.

You will be able to show others how to explore and navigate the Sketchfab app.



## What is Sketchfab?

Sketchfab is a platform to publish, share, discover, buy and sell 3D, VR and AR content.

## Activity Instructions

1. Complete the Roundtable activity
2. Create an account on to the Sketchfab website to create your own playlist, or use the STEM YOUiversity's pre-made model playlists
3. Complete the [Playlist Creation Exercise](#) to formulate what kinds of models to look for when creating your playlist
4. Create a playlist of 3D models to present your interests/ career ambitions in 4-H projects
5. Use Sketchfab to test out the 3D models you saved to your playlist in a Virtual Reality space

### Virtual Reality (on mobile)

VR is compatible with [Google Cardboard](#) viewers and other cardboard compatible devices including clip-on style VR glasses like [Homido Mini](#), as well as the Samsung Gear VR and Oculus Go.

Samsung Gear VR supports: [Galaxy S6](#), [Galaxy S6 Edge](#), [Galaxy S6 Edge+](#), [Samsung Galaxy Note 5](#), [Galaxy S7](#), [Galaxy S7 Edge](#), [Galaxy S8](#), [Galaxy S8+](#), [Samsung Galaxy Note Fan Edition](#), [Samsung Galaxy Note 8](#), [Samsung Galaxy A8/A8+ \(2018\)](#) and [Samsung Galaxy S9/Galaxy S9+](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

## Required materials



- 1) A cellphone
- 2) An XR headset (with cutout space for phone camera) to present VR material
- 3) A computer to access Sketchfab online site



- 4) Create a Sketchfab account

<https://sketchfab.com>



If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!

# Roundtable Activity

**Ice Breaker: Have your students take 5-10 minutes to search for virtual reality that pertains to their identity/interests. These links are a few examples to get started!**

**If you cannot find examples that fit with yourself or your interests, describe what kind of tool or app you'd like to see or make yourself.**

MY NAME IS \_\_\_\_\_

I IDENTIFY AS \_\_\_\_\_

I COME FROM \_\_\_\_\_

I GREW UP WITH \_\_\_\_\_

MY HOBBIES INCLUDE \_\_\_\_\_

SOMETHING I WOULD LIKE TO LEARN \_\_\_\_\_

SOMETHING I HAVE GREAT SKILL IN \_\_\_\_\_

**Techno-Latinx**

**Virtual Pride**

**Virtual Songlines  
(Aboriginal and Torres  
Strait Islander VR  
Experience)**

**Once you have found some examples go around the room and share.**

## References

"Discovering My Identity." Learning for Justice, [www.learningforjustice.org/classroom-resources/lessons/discovering-my-identity](http://www.learningforjustice.org/classroom-resources/lessons/discovering-my-identity). Accessed 5 Sept. 2023.

TecnoLatinx XR Labs brings Emerging Technology to All Communities. (n.d.). TecnoLatinx VR Lab. <https://tecnoLatinx.com/>

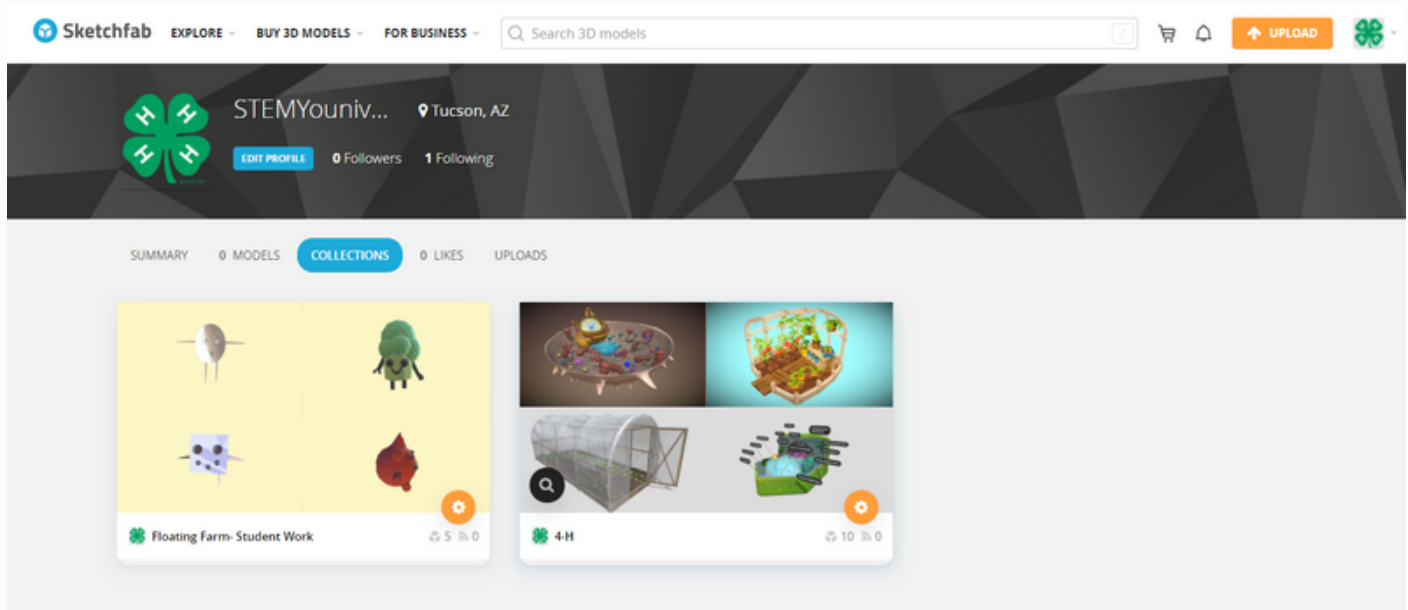
Mileva, G. (2022). Virtual Reality Experiences Empower LGBTQ Youth To Take Pride In Themselves | ARPost. ARPost. <https://arpost.co/2019/06/11/virtual-reality-experiences-empower-lgbtq-youth-to-take-pride-in-themselves/>

Hardy, E. (2020, June 5). This Indigenous creator built a virtual reality program to celebrate First Nations cultures - Create. Create. <https://createdigital.org.au/indigenous-creator-builds-virtual-reality-program-first-nations-cultures/>

# Step 1: Logging in to Sketchfab

If you are going to be creating your own playlist and not using one of the pre-made ones in the STEM YOUiversity account create your own profile and skip to **Step #2: Playlist Creation Exercise**. If you would like to use a pre-made playlist continue to the instructions below

1. Go to the 4-H STEM YOUiversity Sketchfab account at [https://sketchfab.com/STEM\\_YOUiversity](https://sketchfab.com/STEM_YOUiversity).
2. On the left-hand side, click on the Collections tab. Here you will find the different playlists saved. Skip ahead to **Step 4: Trying out the Sketchfab app**



# Step 2: Playlist Creation Exercise

Please write a few sentences for the following

1. What other 4-H projects are you working on? Do you have any interests or skills that you would like to share with the community? How can these be demonstrated through 3D models?

---

---

---

---

2. List your interests and skills as single words (These will be used to look up 3D models later on)

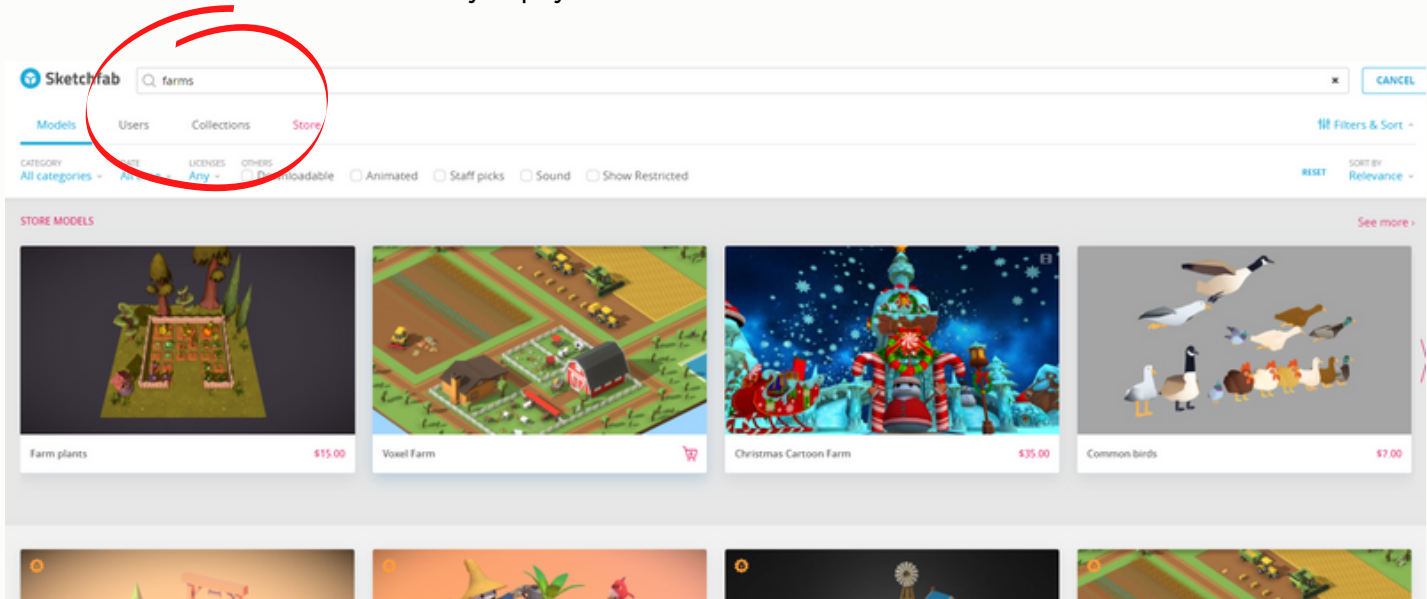
---

---

---

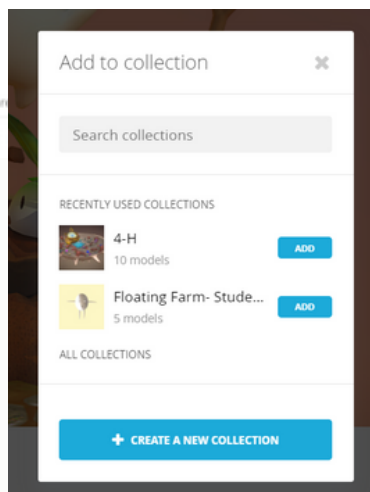
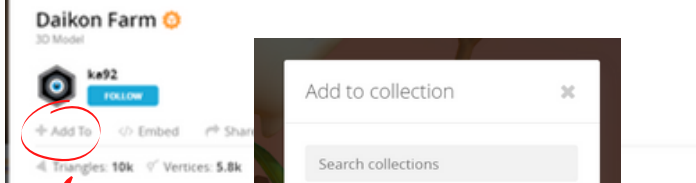
# Step 3: Creating a playlist of 3D models

After coming up with a few different ideas for models from the exercise, use the search bar at the top of the Sketchfab website to find models to add to your playlist



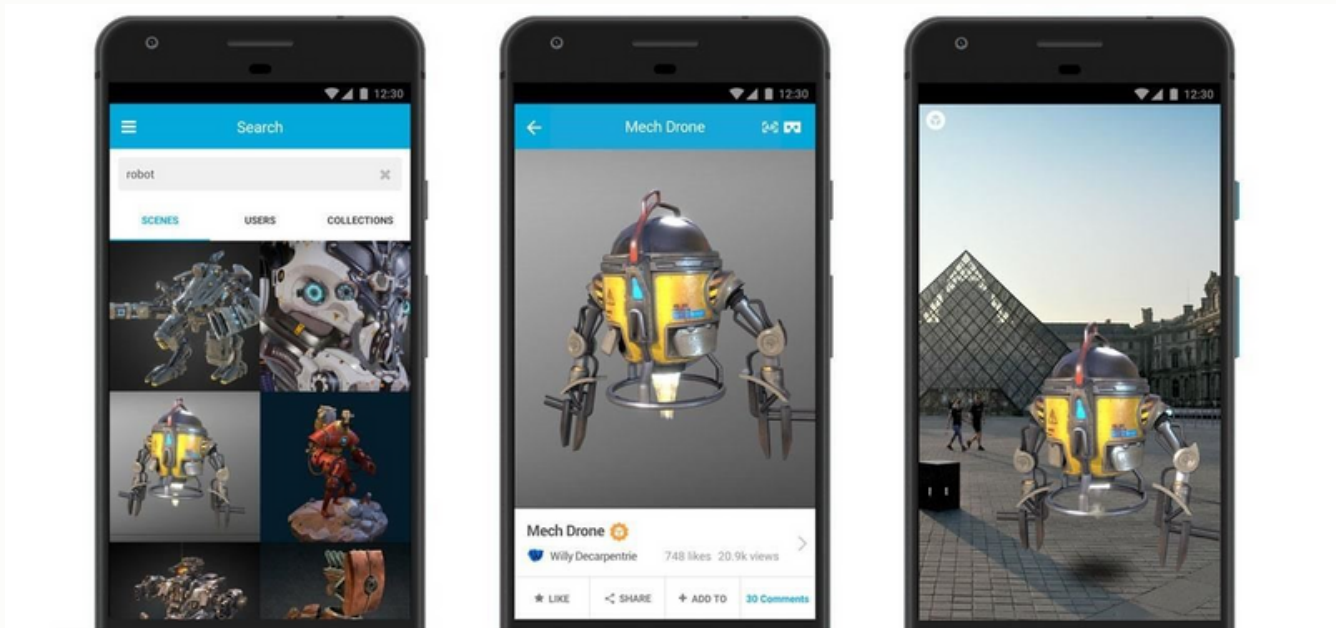
To add a model to a playlist to view later, click on the image and go to the lower left-hand corner to "Add to"

From there, a window will pop up. You can add to your current collection or you can create a brand new collection.

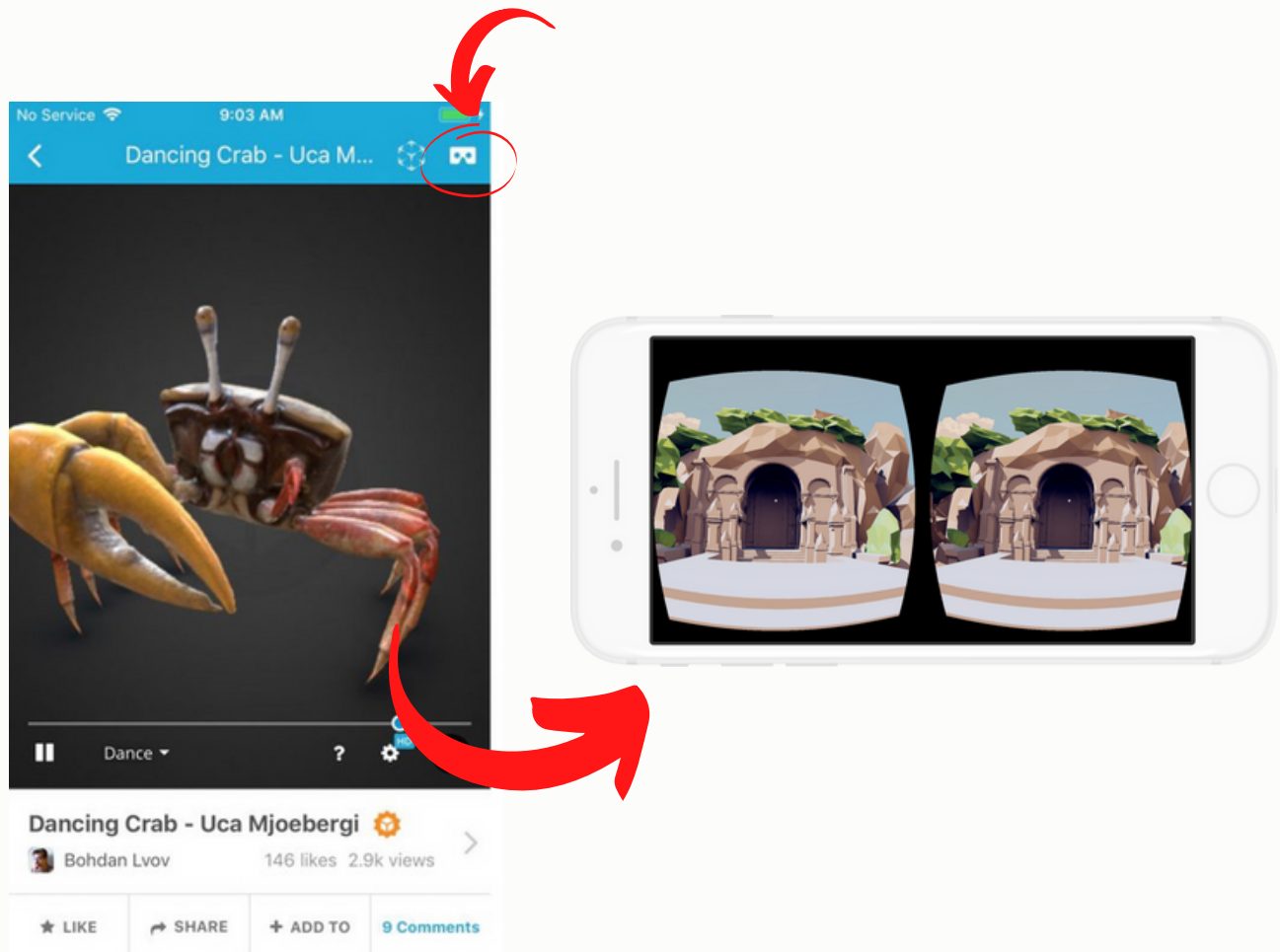


Repeat these steps until you have around 5-10 models in your playlist to view.

## Step 4: Testing your scene in Sketchfab



To present an item as a VR scene, select the cardboard logo in the app in the upper right-hand corner and place your phone in the XR headset to view!







# 45 MINUTE VR ACTIVITY

Please read the scenario before moving on to the instructions!



45 min

TIME  
LIMIT



25 PEOPLE



MIDDLE SCHOOL  
OR  
UPPER ELEMENTARY

## Creating a VR Scene Using Sketchfab and Tinkercad

LOCATION: SCHOOL CLASSROOM

LEVEL: MIDDLE SCHOOL OR UPPER ELEMENTARY

GROUP SIZE: 25

TIME LIMIT: 45 MINUTES

Using the online software Tinkercad you will create an original 3D model to then upload to the Sketchfab website (a 3D model presentation website) to then present on the Sketchfab app.

This activity is to show how to create 3D models and showcase them online as a virtual reality scene through the Sketchfab app.



#### What is Sketchfab?

Sketchfab is a platform to publish, share, discover, buy and sell 3D, VR and AR content.

#### What is Tinkercad?

Tinkercad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use.

## Activity Instructions

1. Create a Tinkercad account
2. Complete the [Designing a 3D model worksheet](#)
3. Creating your 3D model in Tinkercad
4. Downloading your 3D model
5. Creating a Sketchfab account
6. Uploading your 3D model (as a GLTF)
7. Preparing your 3D scene
8. Present 3D model in Sketchfab

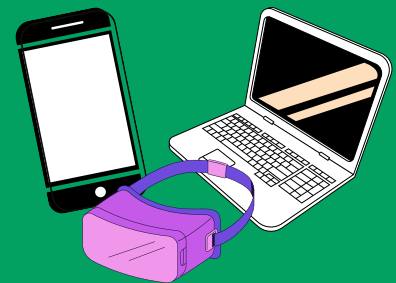
#### Virtual Reality (on mobile)

VR is compatible with [Google Cardboard](#) viewers and other cardboard compatible devices including clip-on style VR glasses like [Homido Mini](#), as well as the Samsung Gear VR and Oculus Go.

Samsung Gear VR supports: [Galaxy S6](#), [Galaxy S6 Edge](#), [Galaxy S6 Edge+](#), [Samsung Galaxy Note 5](#), [Galaxy S7](#), [Galaxy S7 Edge](#), [Galaxy S8](#), [Galaxy S8+](#), [Samsung Galaxy Note Fan Edition](#), [Samsung Galaxy Note 8](#), [Samsung Galaxy A8/A8+ \(2018\)](#) and [Samsung Galaxy S9/Galaxy S9+](#).

<http://help.kubity.com/en/articles/2281885-what-are-the-minimum-system-requirements>

### Required materials



- 1) A cellphone
- 2) An XR headset (with cutout space for phone camera) to present VR material
- 3) A computer to access Sketchfab online site



- 4) Create a Tinkercad account  
<https://www.tinkercad.com>



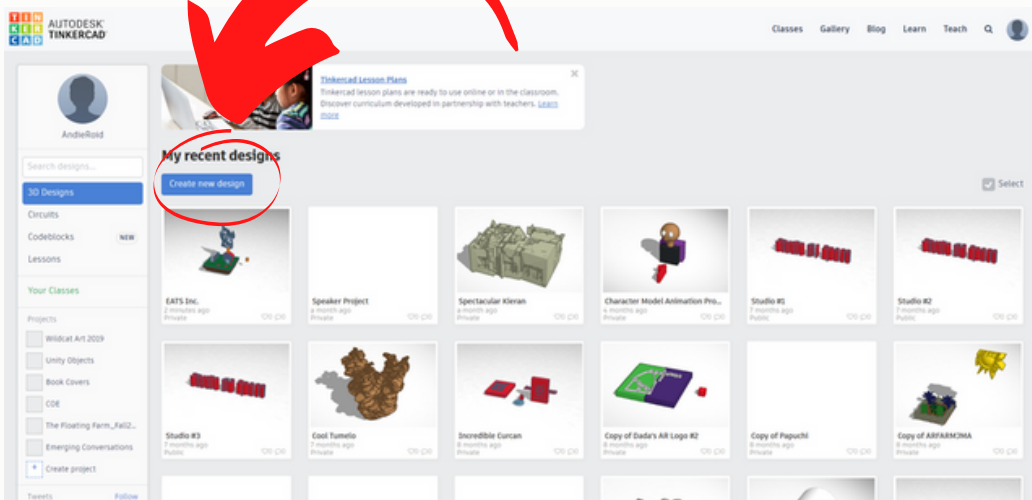
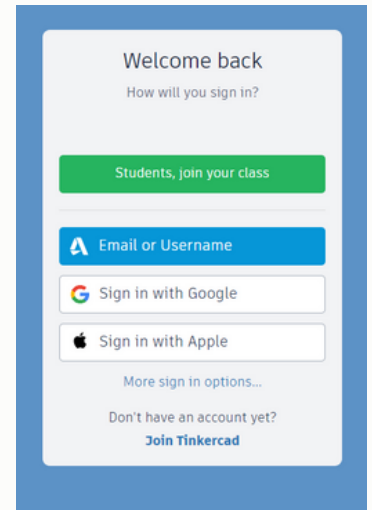
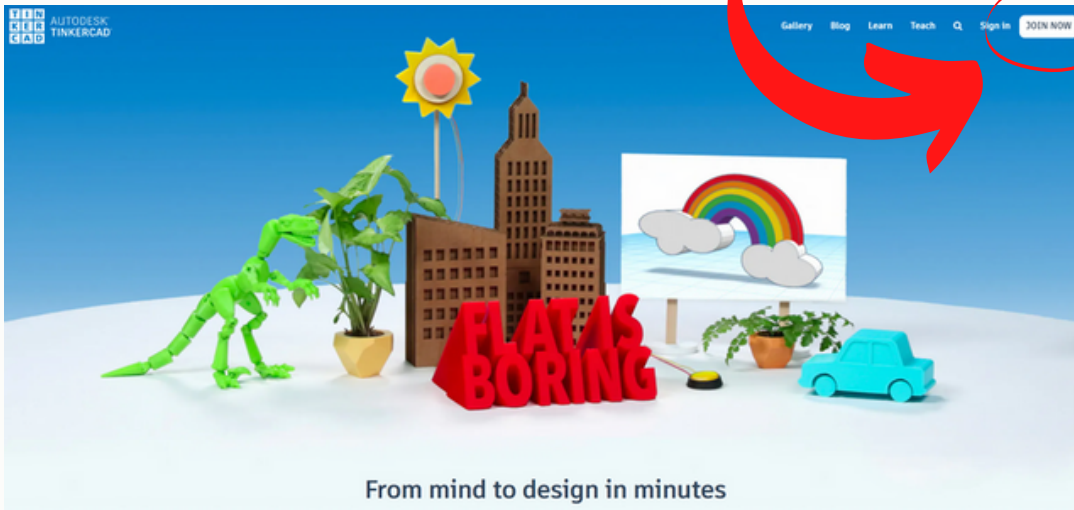
- 5) Create a Sketchfab account  
<https://sketchfab.com>



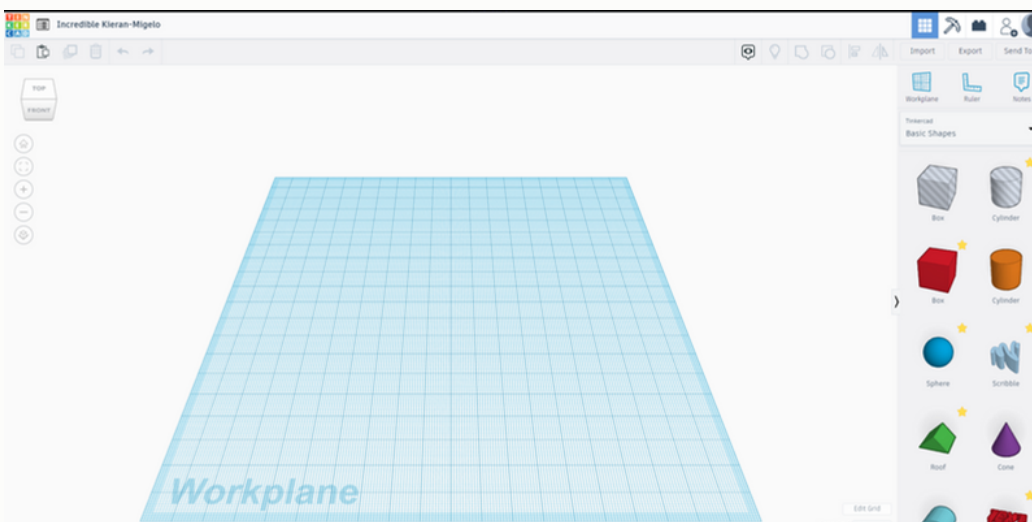
If you need a little more assistance, visit the 4-H STEM YOUiversity Youtube page for instructional videos!

# Step 1: Create a Tinkercad Account

Go to the Tinkercad website and create an account (Note: white button upper right-hand corner of the screen). Create an account with an email account.



Once you have logged in to your Tinkercad account, on the right-hand side click on the "Create New Design" button to begin creating a 3D model



When you start a new project it should look like this.

Before you can start building your 3D model you need to sketch out a plan on how to build it!

## Step 2: Designing a 3D Model Worksheet

What would you like to create a 3D model of? Try to keep your design simple, you can always come back to it later!



# Step 3: Creating your 3D Model in Tinkercad

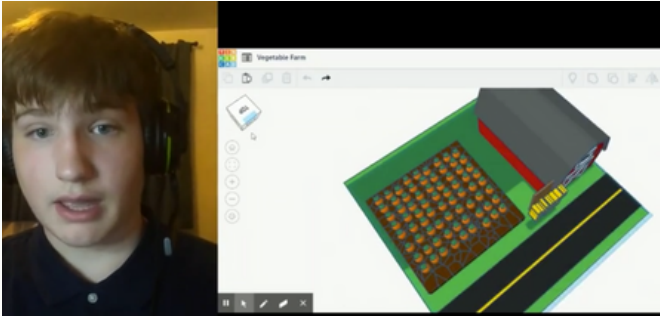


Image: Example of STEM Ambassador's work in Tinkercad

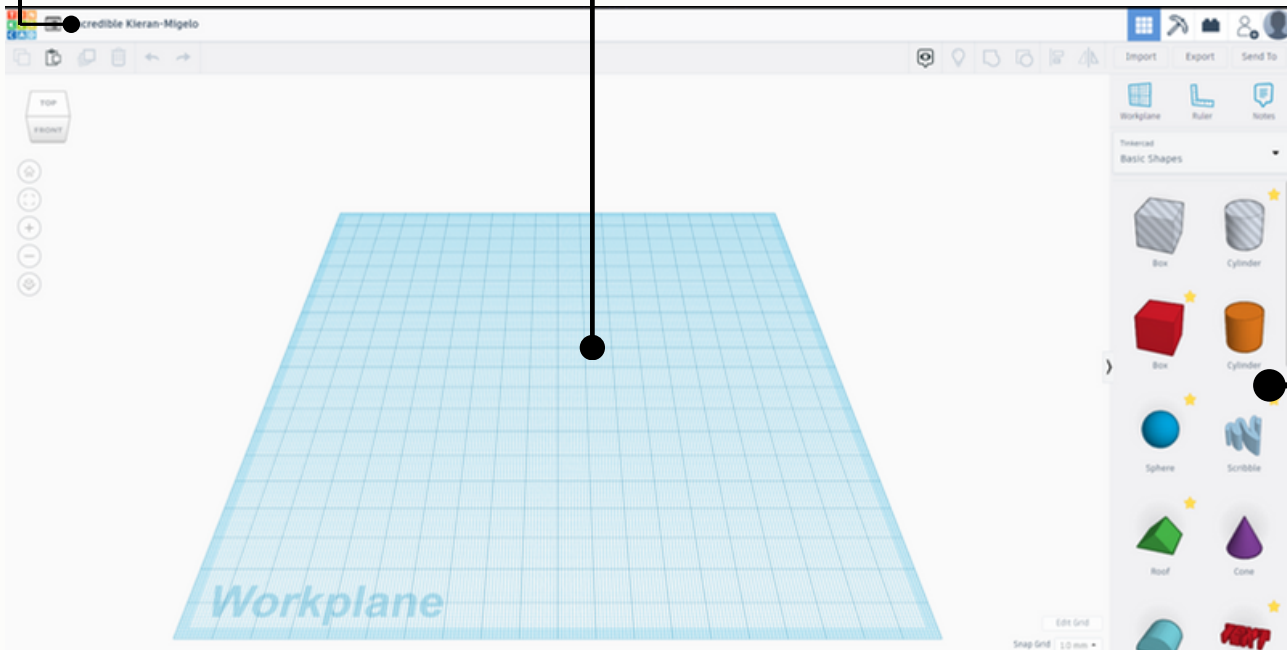
Below is a brief coverage of what the software allows you to do. You can make your model as simple or complex as you'd like!

That being said you do not need to create everything from scratch. However it is a good note of practice to give credit if you are using models made by others.

Here, you can change the name of your model

Main workspace. You can drag items from the right-hand side here to begin building your 3D model

Here you can choose from a wide variety of shapes and pre-made 3D models to come up with your own creations. You can even save your own designs to use as pre-made materials later!



## Step 4: Downloading your 3D Model

Once you are finished creating your 3D model go to the upper right-hand corner and select the "Export" button. Select the GLTF (.glb) option. This is so when you upload the 3D model to Sketchfab the model keeps its color!

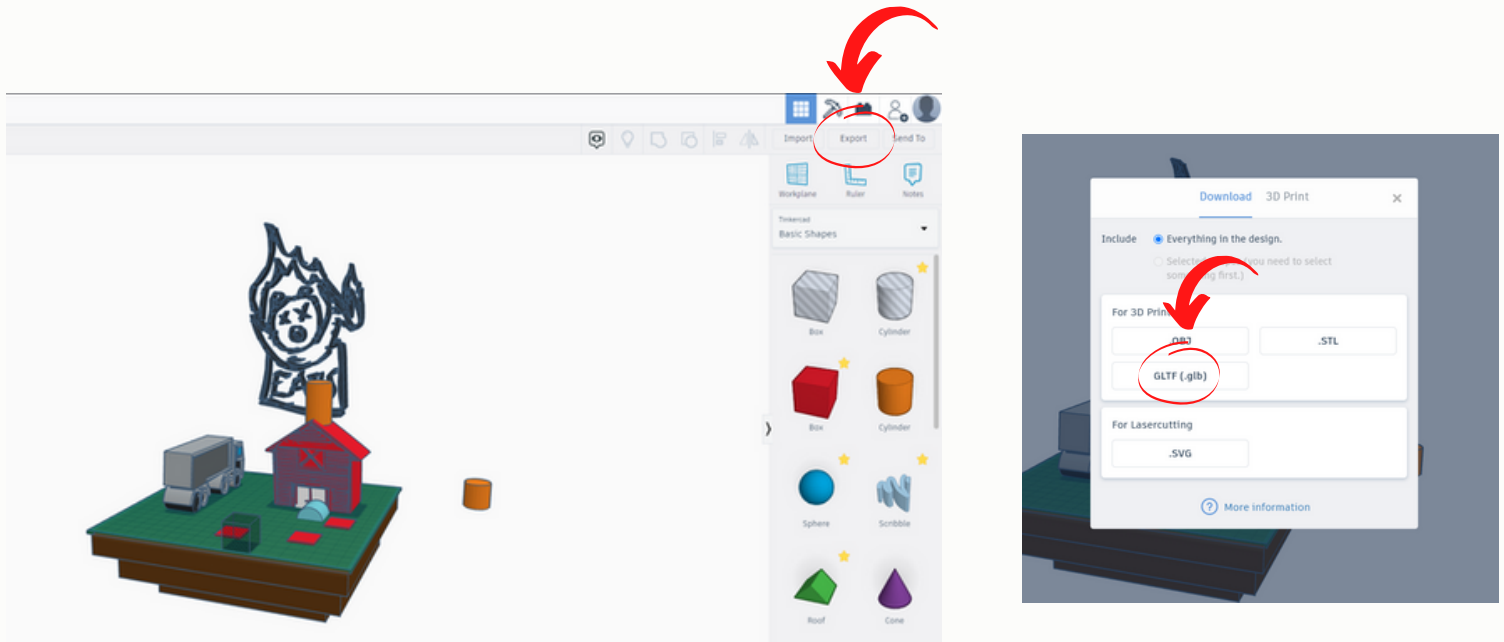


Image: Example of STEM Ambassador's work in Tinkercad

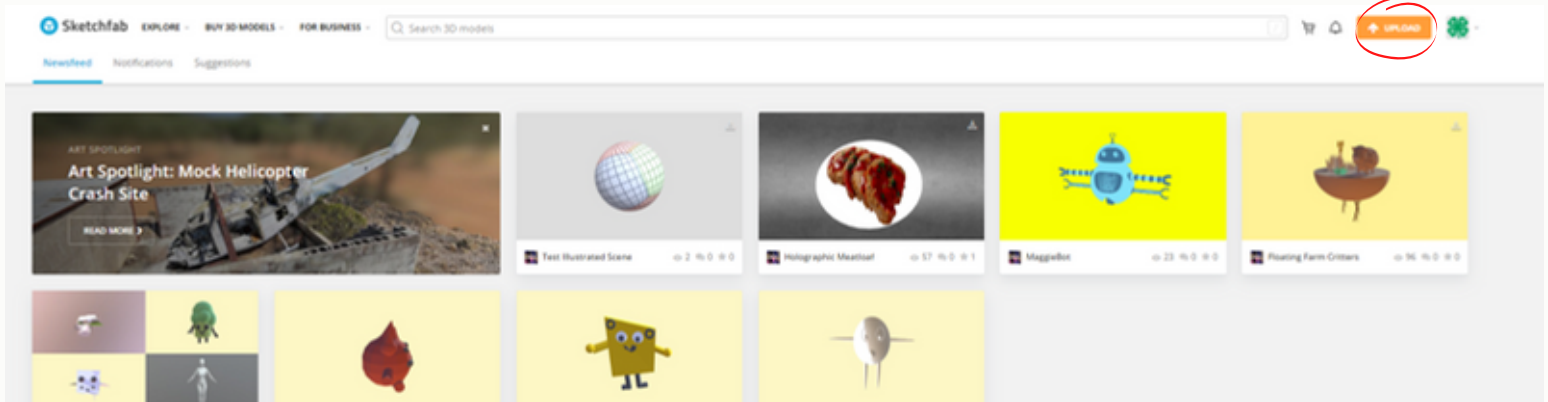
## Step 5: Creating a Sketchfab account

Log into the Sketchfab website and create an account. This is so you can save 3D models and download models.



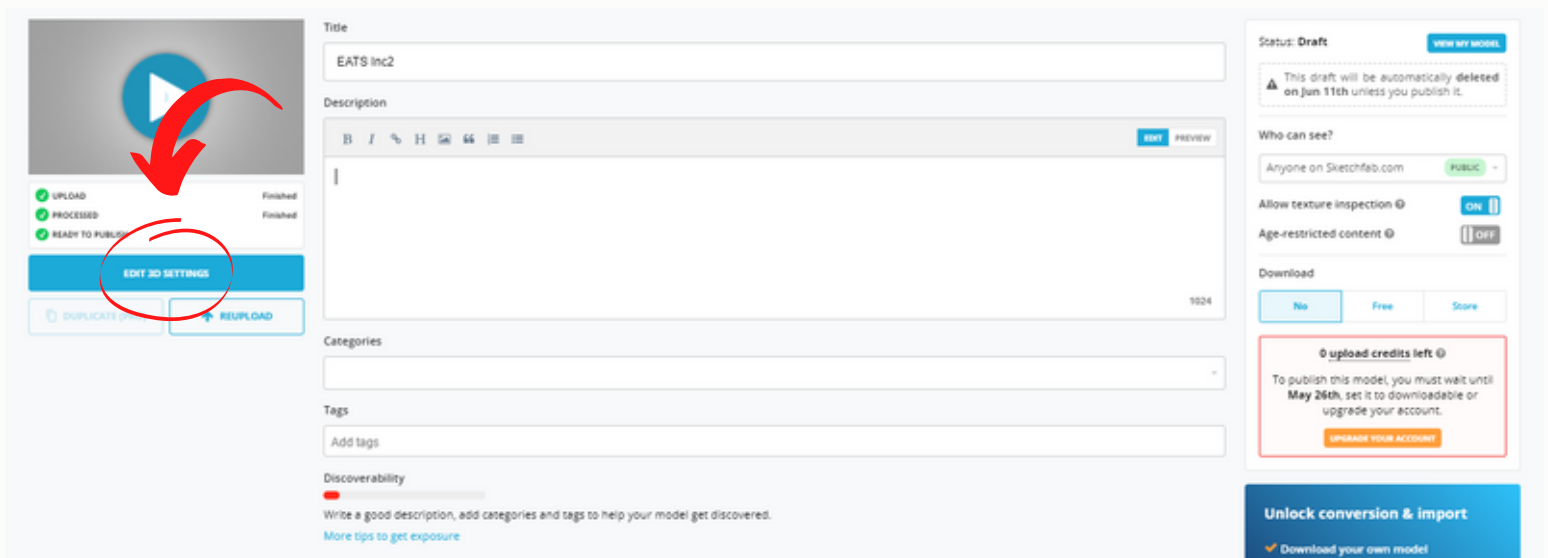
# Step 6: Uploading your 3D Model

Once you have logged in to your Sketchfab account, go to the "Upload" button in the upper-right hand corner.



Select the GLTF (.glb) model you downloaded from the Tinkercad website. Once the upload begins, you can fill out the "Title" and the "Description".

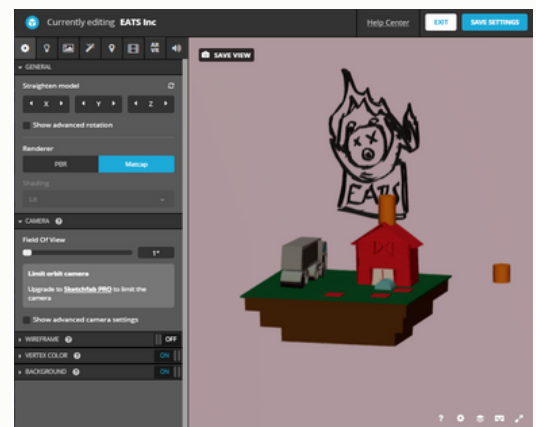
Once you are finished, [click the "Edit 3D Settings"](#).



# Step 7: Preparing your 3D Scene

Before testing out your scene you will want to add any wanted sound effects, lighting, and fix the color on the model.

**PLEASE NOTE:** Sketchfab does have certain features reserved for a paid subscription



Let's begin in the main settings. Make sure you have selected the gear icon to get there. We will be setting up the color, background, and getting the color back onto the 3D model.



### GENERAL SETTINGS

Select "Matcap". Matcap stands for "material capture" and is an image that is used as an image texture to fake a whole material including lighting and reflections in 3D applications.



### VERTEX COLOR

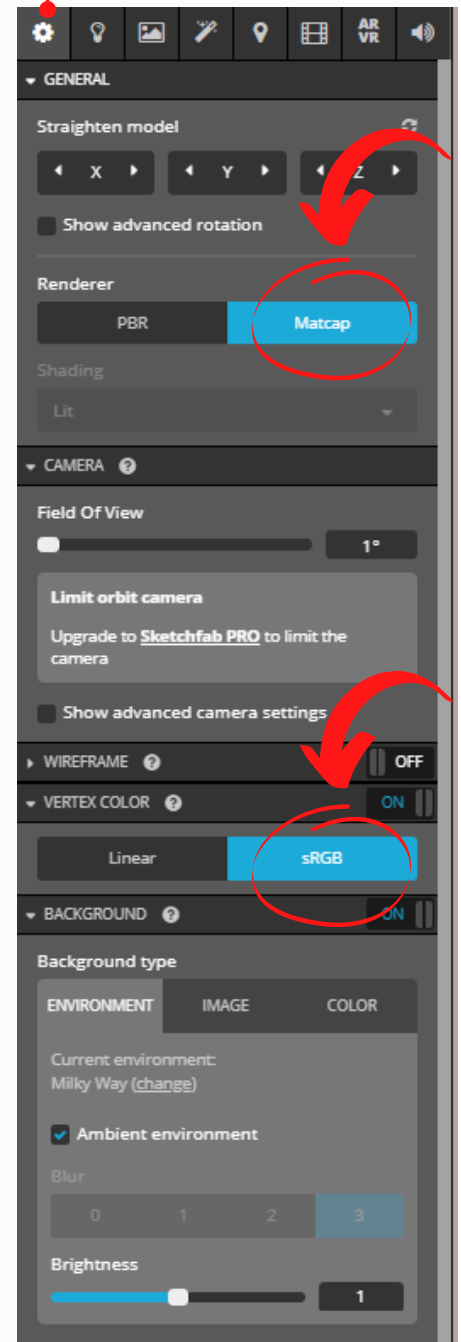
Here, selecting sRGB allows for the original colors of the model from Tinkercad to show.



### BACKGROUND

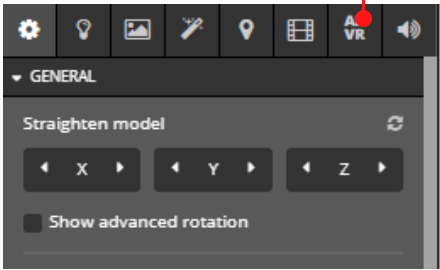
Here, you can select your background color, or choose an "Ambient Environment" to select a more interesting lighting setup.

Main Settings Tab

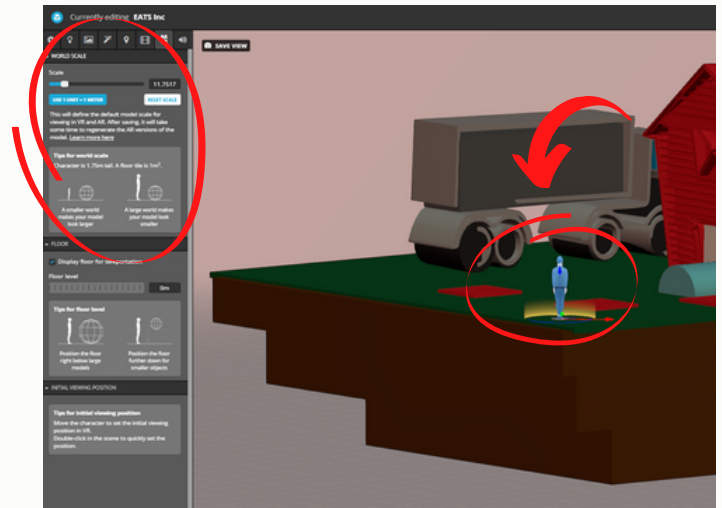




AR/VR Tab

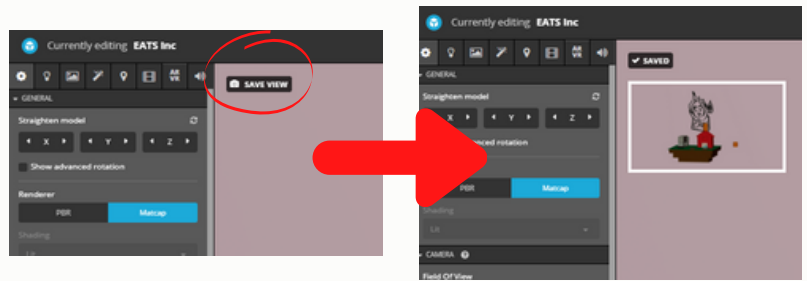


Next, you will select the AR/VR tab to manage the size of your scene when you view it on the Sketchfab app in AR/VR mode



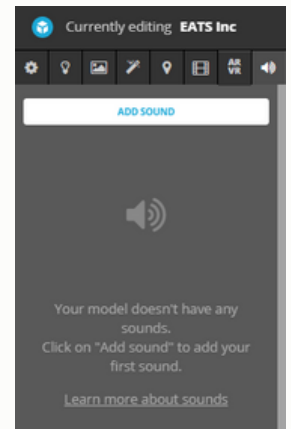
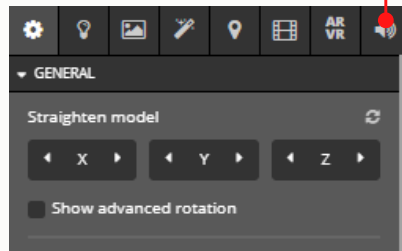
Once you have finished setting the scale and lighting you can save a screenshot of your model using the "Save View" button.

This is how your model will appear when others look for it/how it will be previewed on your profile.



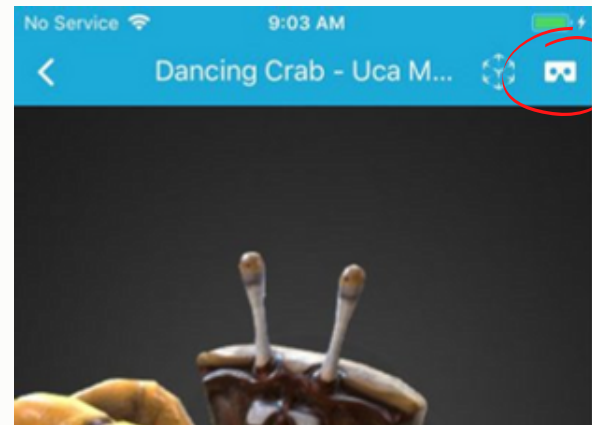
Sound Effect Tab

If you would like to add sound to your scene you can select the "Sound Effect" tab and upload your file.



## Step 8: Present 3D Model in Sketchfab

- Log into your profile on Sketchfab
- Select your model and click on the VR headset icon (white goggles)
- Enjoy!



# APPENDIX



## LISTED SOFTWARE

### **Quiver AR (Used in AR Activity 1)**

Quiver is a company that specializes with augmented reality coloring pages. You download their app, print out their coloring pages, and combine the two for a fun and great introduction into augmented reality technology by watching the page come to life!

<https://quivervision.com>

### **Sketchfab (Used in AR Activity 2 and 3, and VR Activity 2 and 3)**

Sketchfab is a platform to publish, share, discover, buy and sell 3D, VR and AR content.

<https://sketchfab.com>

### **Tinkercad (Used in AR Activity 3, and VR Activity 3)**

Tinkercad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use.

<https://www.tinkercad.com>

### **FarmVR (Used in VR Activity 1)**

An immersive technology studio, working with virtual reality in agriculture, as well as augmented reality (VR & AR). Based in Adelaide, Australia.

<https://farmvr.com>



## ALTERNATIVE SOFTWARE

### **Alternative 3D Modeling Software**

- 3DC.io
- Morphi 3D
- Sculptris
- Nomad (for tablet use only, one time fee)

### **Alternative XR Software**

- Unity Game Engine (with Vuforia)
- Unreal Game Engine
- CoSpaces AR (with Merge)
- ARjs (web AR)
- 8th Wall

