

3D Modelling & Printing

In this science and technology lesson, students will work to create a 3D Model using Blox 3D Junior and export the 3D Model to a 3D Printer and print and paint the model using basic hand techniques such as sanding, polishing, spray painting and hand painting.



Grade Level: 7 - 12th



Subject: Science and Technology



Length of Time: 30 Minutes a Day for Several Weeks

Objectives & Outcomes

Learners will appropriately use 3D Software, 3D Printers and various hand finishing techniques in order to create 3D Printed Models

Materials Needed

Blox 3D Junior

3D Printer such as Makerbot

File (For Polishing), Acrylic Paint Spray Can, Acrylic Paints, Bottle, Brush

Paint Mask

Procedure

Opening to Lesson

Begin by opening the software Blox 3D Junior on your mobile device such as an Ipad. Explain the building tools in Blox 3D Junior, which utilizes tap and double tap as a mechanism and build a basic model such as a fish or a plane. Show the process of emailing the resulting model using the 3D Print tool to an .STL file.

Show how the .STL file can be printed in a 3d Printer with the in-app video in the help section of the app. If you have access to a 3D Printer, show how the .STL file can be loaded into the printer and printed. If you do not have access to a 3D Printer, you can upload the .STL file to www.3dhubs.com for print -on-demand and then delivery to your address.

Body of Lesson

Give students a copy of the software

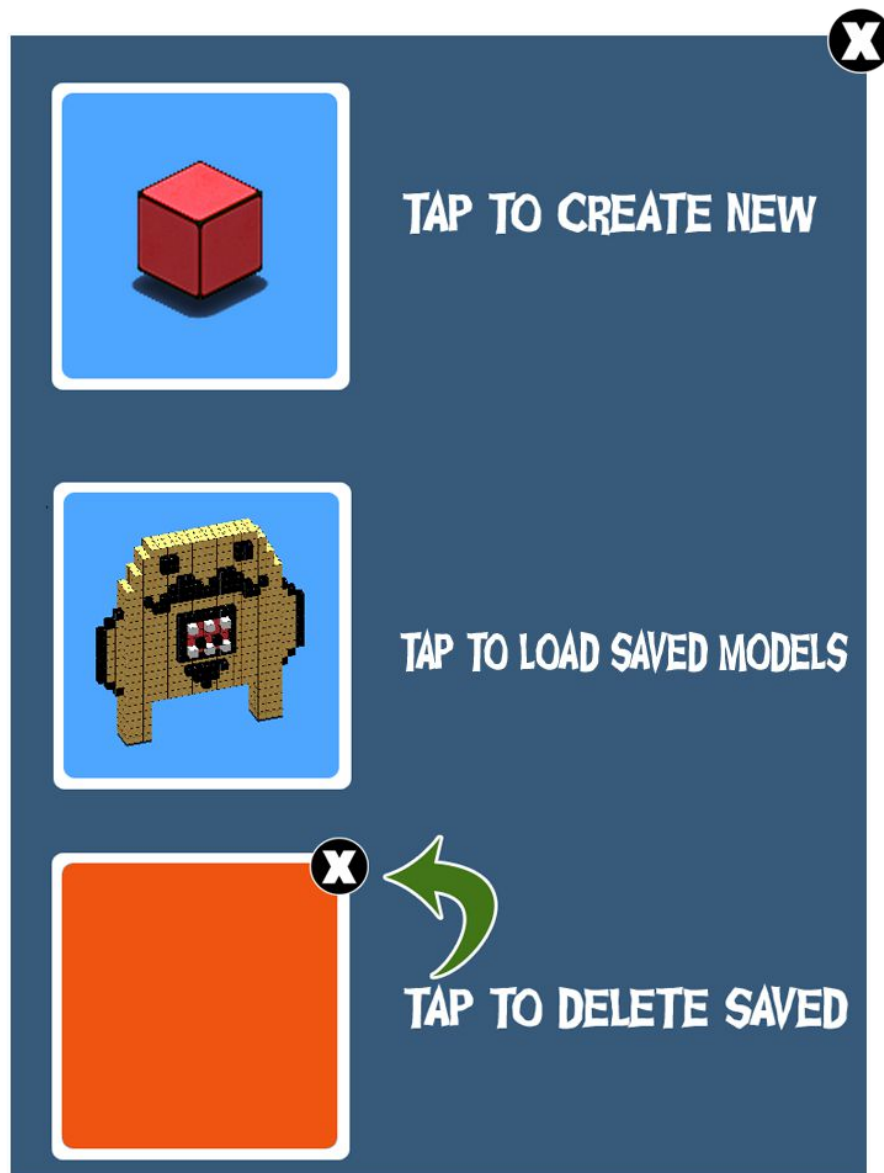
Students must design their 3d model, with the following themes: Animals, Objects, Buildings

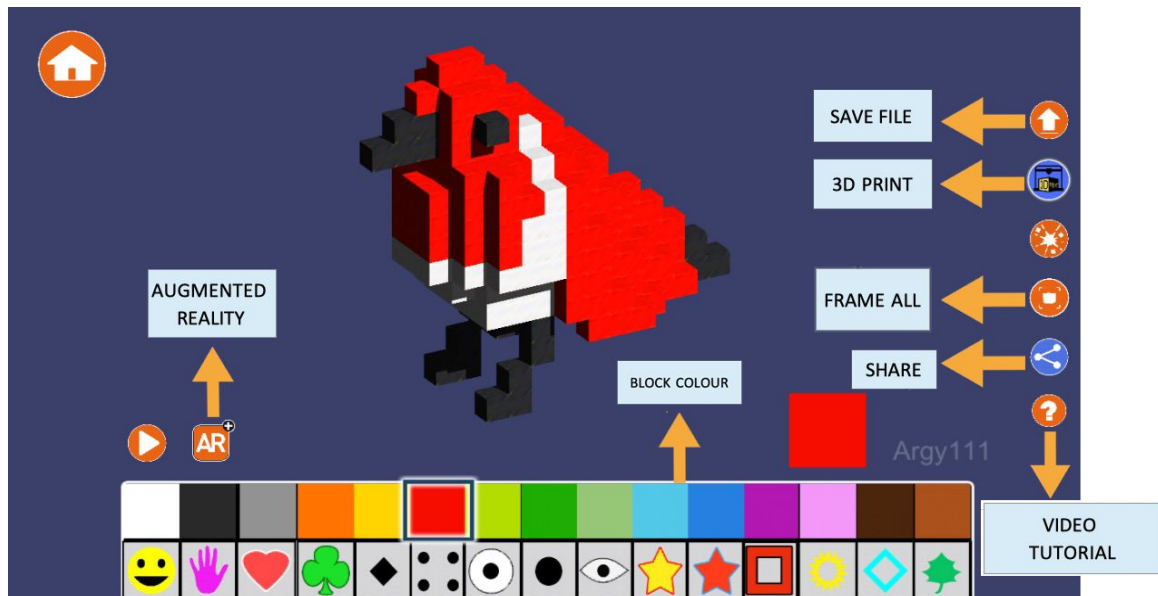
Students should first sketch their design down on paper and try to match their 3D Model to the design. 3/4ths, side and top views are required as per example.

Explain that over the next few days they are to create a 3D Model of an animal, a vehicle or a diorama in 3D , print it in a 3D Printer and polish/paint it to get a finished model.

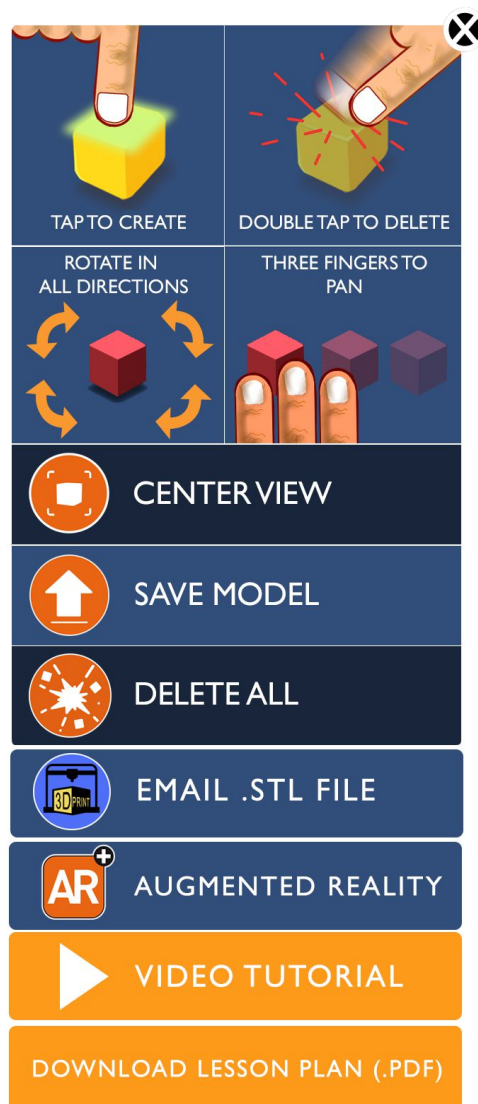
Explain that the models should be typically printed at a size not exceeding 5-10 cms

1.Introduction to the software:Blox 3D Junior

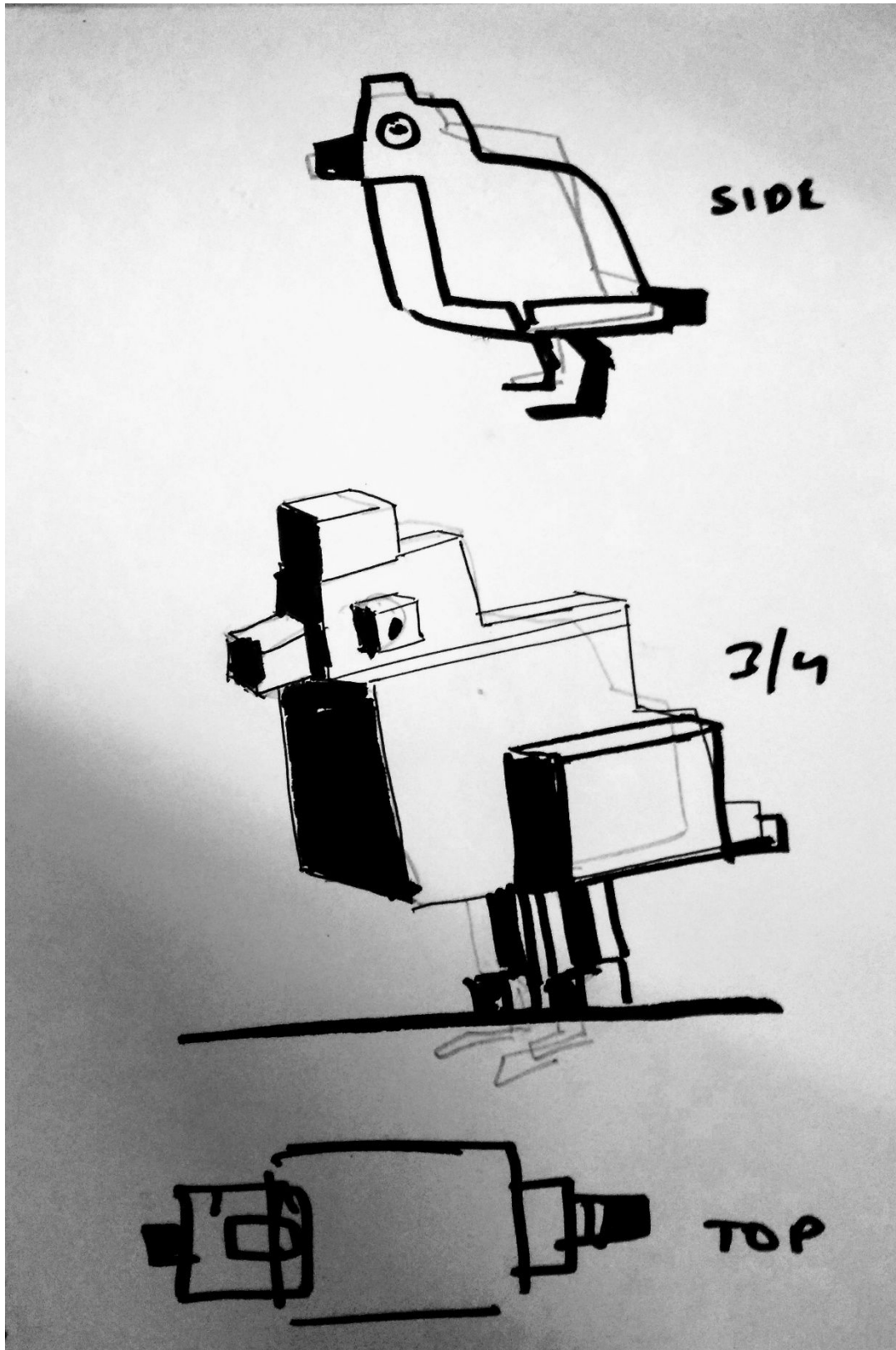




BASIC NAVIGATION AND VIDEO TUTORIAL LINK



2. EXAMPLE OF DESIGN DRAWING



3.CREATE 3D MODEL IN BLOX 3D JUNIOR



4.EMAIL AND PRINT TO .STL FILE



When you press the 3D Print icon,an .STL(StereoLithography file) is generated and a email is created with the .STL file attached.User can email the file to someone to download and use the .STL file for printing.

iPod 1:30 PM

Cancel Blox3DJunior 3351.s... Send

To: example@example.com

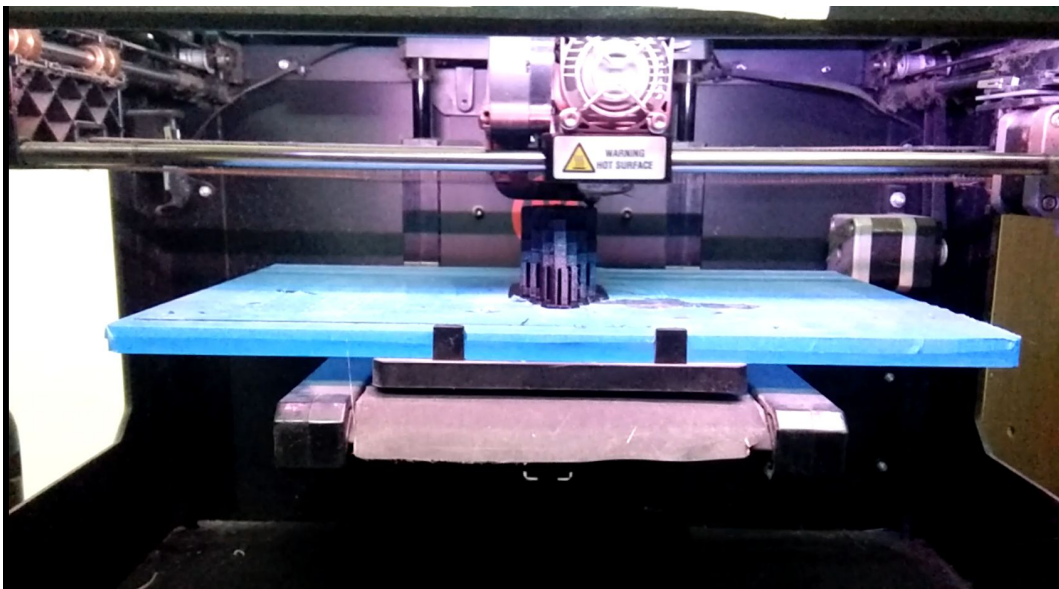
Cc/Bcc:

Subject: Blox3DJunior 3351.stl File
Attached

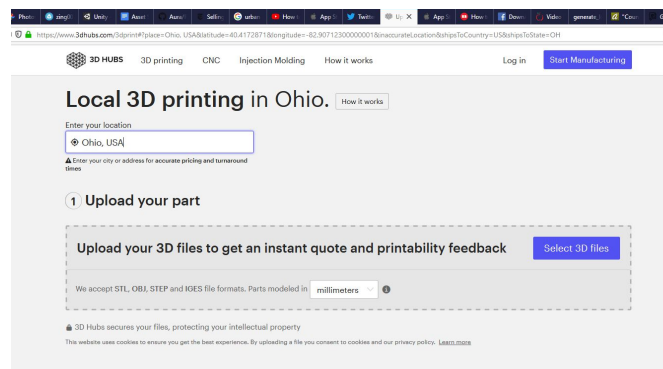
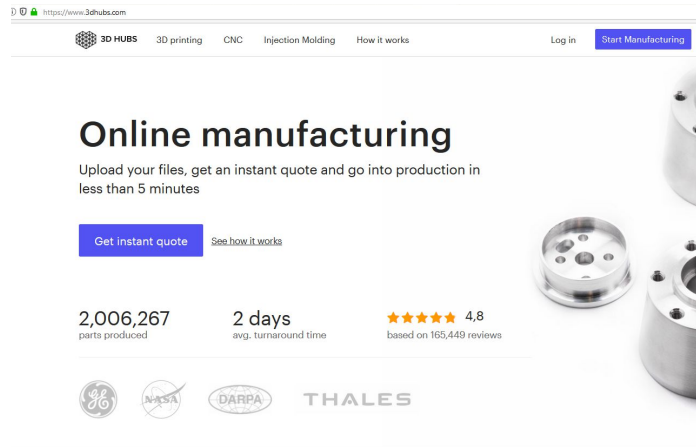
Operating Instructions

- 1)Forward this email to your account and download the attachment(.stl file) to your device.
- 2)Submit your .stl to www.shapeways.com or 3dhubs.com to 3D Print the file.
- 3)Alternatively, you can import the .stl into a local 3D Printer such as Makerbot and 3D Print yourself.

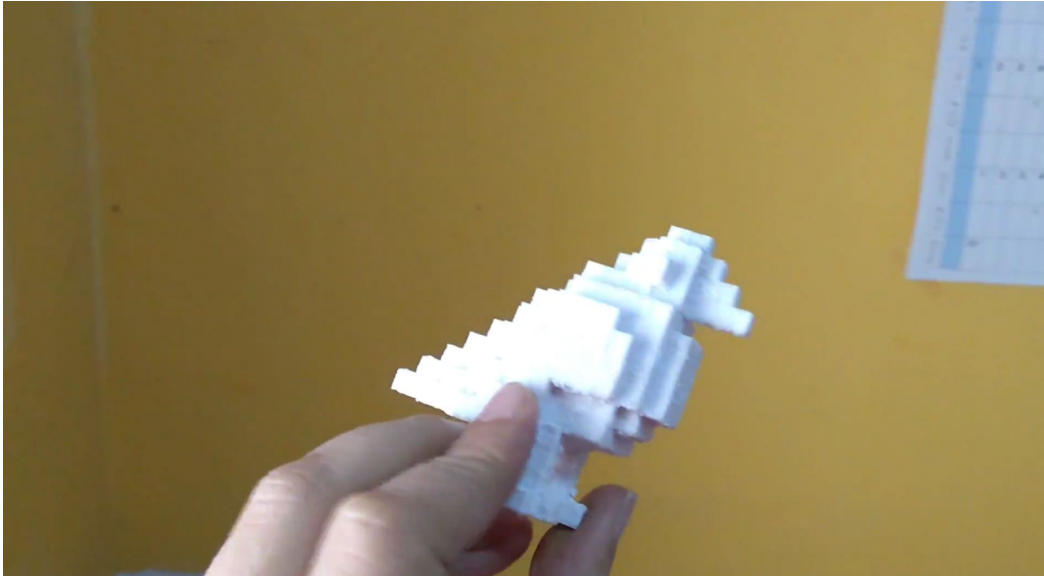
5. 3D PRINTING AND PAINTING



Open .STL file with the 3D Printer software and print. Select material type according to budget
Ranging from FDM (Cheapest) to ABS (Expensive)
Alternately, upload .STL file to www.3dhubs.com to have it printed remotely and shipped to you.



6.Model Finishing and Painting

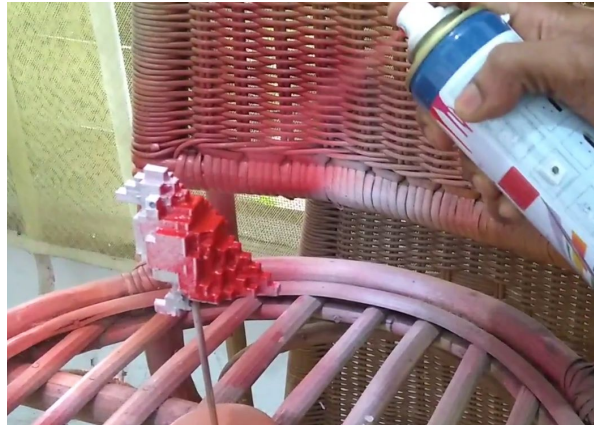


This is an FDM Print of the 3D Model. It is rough and unfinished due to the quality of FDM material.

Using more expensive materials such as SLS or ABS will get a much better result, but will be expensive!



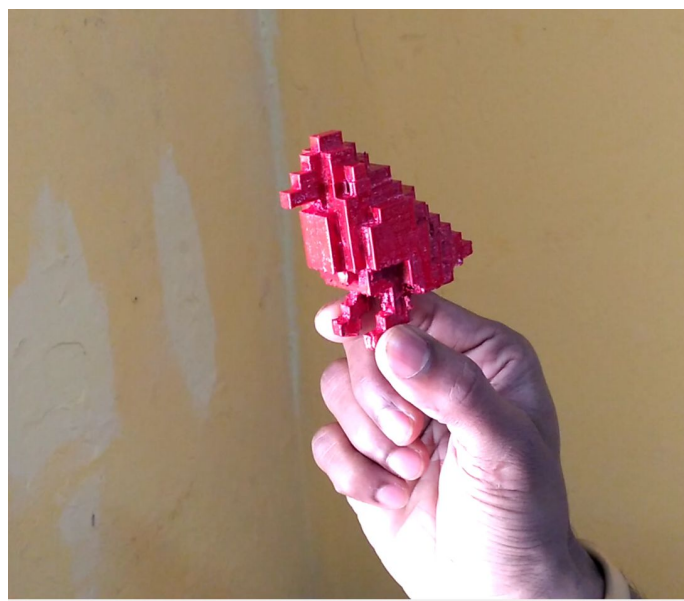
Polish with nail file or sandpaper to remove rough edges



Apply undercoat by holding can 10-15 cms away and spraying uniformly with an acrylic paint spray can. Make sure you cover the model with a thin paint of coat and allow to dry under sunlight or a dry place for a few hours.



Use a paint mask while spraying to protect your eyes and ears



Painted Bird with a uniform red coating applied all over

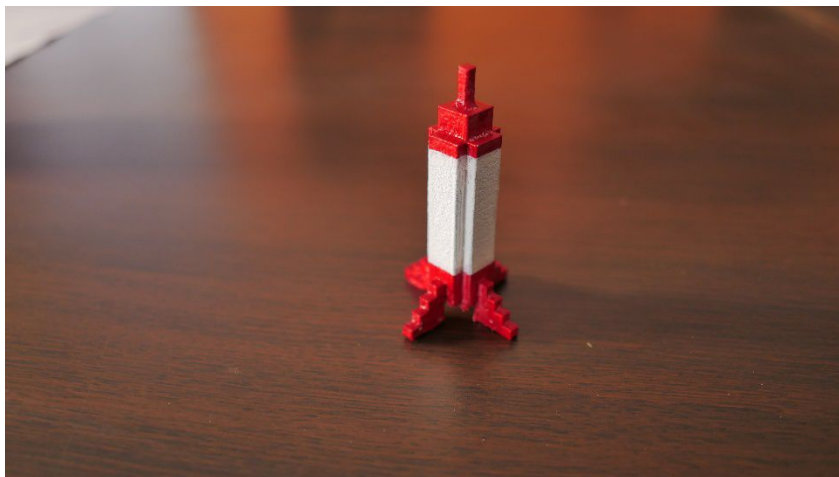
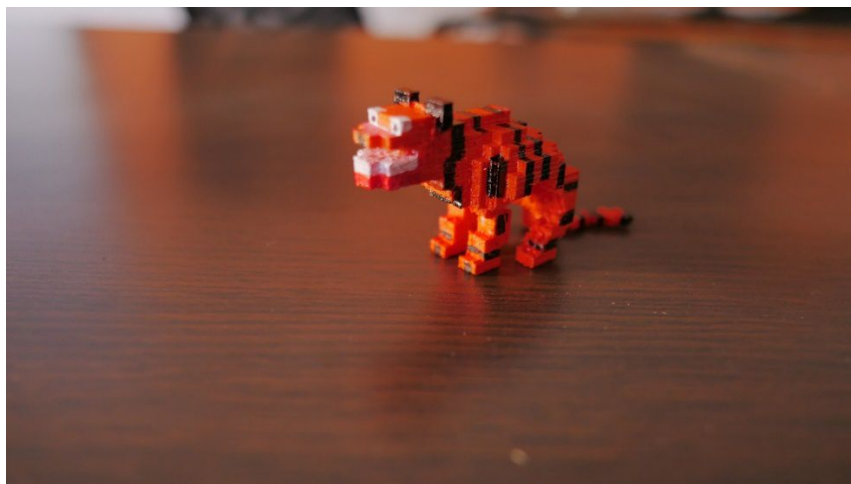
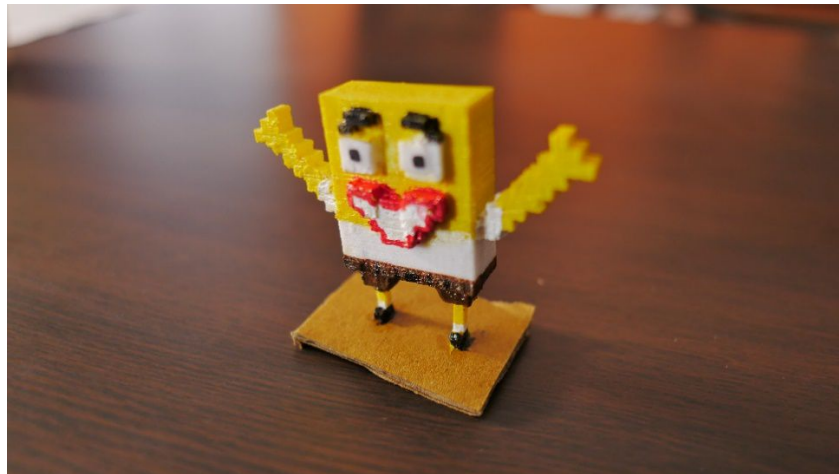


Apply detail with brushes and acrylic paints ,using uniform brushstrokes and even application.

Finished Model

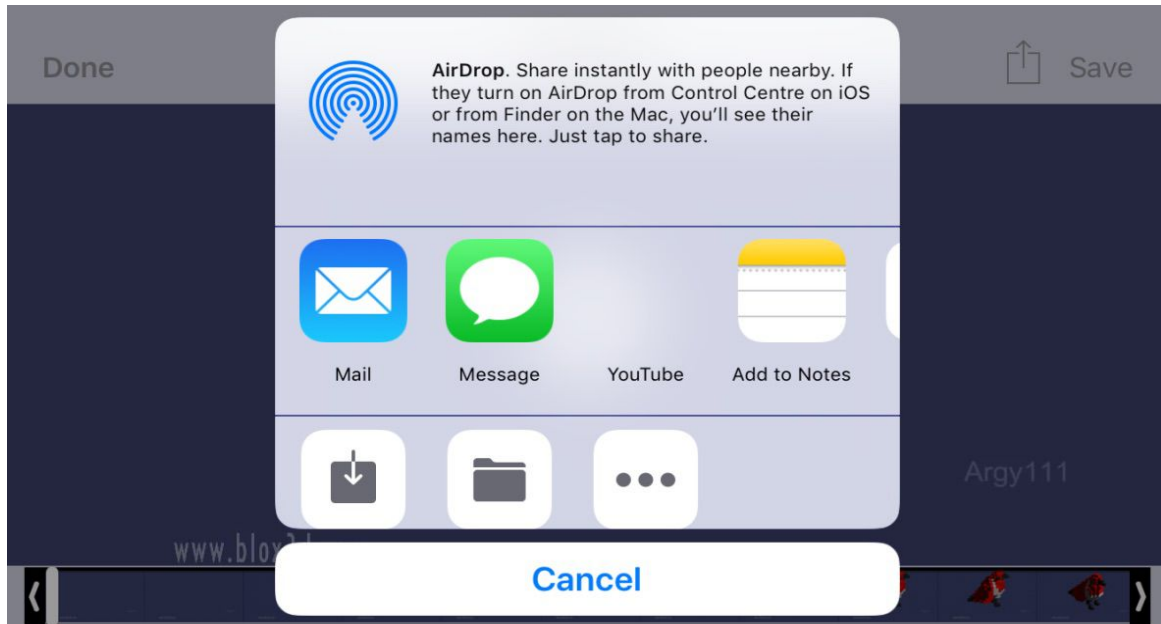


3D Models Examples from Blox 3D Junior



7. Closing

Allow students to share their 3D Prints in class and make small turntable videos ,and share them using the Share function in Blox 3D Junior.



Assessment & Evaluation

Assessment will be based on creating a 3D model that accurately and appropriately showcases the students handdrawn design

Modification & Differentiation

Some students may need to work with a partner or have parent help with this assignment.

GLOSSARY OF TERMS

3D Model: In [3D computer graphics](#), **3D modeling** is the process of developing a mathematical representation of any [surface](#) of an object (either inanimate or living) in [three dimensions](#) via [specialized software](#). The product is called a **3D model**. Someone who works with 3D models may be referred to as a **3D artist**. It can be displayed as a two-dimensional image through a process called [3D rendering](#) or used in a [computer simulation](#) of physical phenomena. The model can also be physically created using [3D printing](#) devices.

Source: https://en.wikipedia.org/wiki/3D_modeling

.STL File: STL (an abbreviation of "stereolithography") is a [file format](#) native to the [stereolithography CAD](#) software created by [3D Systems](#).^{[1][2][3]} STL has several after-the-fact [backronyms](#) such as "Standard Triangle Language" and "Standard [Tessellation](#) Language".^[4] This file format is supported by many other software packages; it is widely used for [rapid prototyping](#), [3D printing](#) and [computer-aided manufacturing](#).^[5] STL files describe only the surface geometry of a three-dimensional object without any representation of color, texture or other common CAD model attributes. The STL format specifies both [ASCII](#) and [binary](#) representations. Binary files are more common, since they are more compact.^[6]

Source: [https://en.wikipedia.org/wiki/STL_\(file_format\)](https://en.wikipedia.org/wiki/STL_(file_format))

3D Printing: **3D printing** is any of various processes in which material is joined or solidified under computer control to create a [three-dimensional](#) object,^[1] with material being added together (such as liquid molecules or powder grains being fused together). 3D printing is used in both [rapid prototyping](#) and **additive manufacturing**. Objects can be of almost any shape or geometry and typically are produced using digital model data from a [3D model](#). There are many different [technologies](#), used in the 3D printing process. The most common^[2] by number of users being [fused deposit modeling](#) (FDM). Thus, unlike material removed from a stock in the conventional machining process, 3D printing or Additive Manufacturing builds a three-dimensional object from a computer-aided design (CAD) model, usually by successively adding material layer by layer.^{[3][4]}

Source: https://en.wikipedia.org/wiki/3D_printing