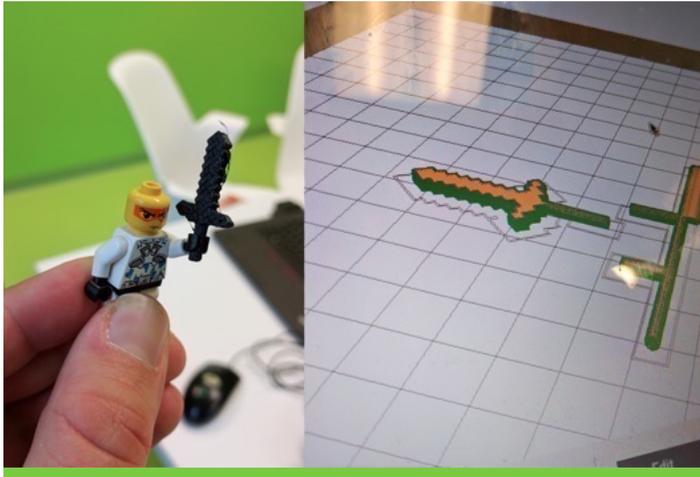


LEGO accessories



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Public

12-15 y-o

Software

TinkerCAD

Description

Learning goals:

- master the basics of TinkerCAD
- understand the concept of "remix"

The objective of this workshop is to create accessories compatible with LEGO minifigures.

The advantage of this workshop is that the objects can be modeled and printed quickly. At the end of the workshop, each participant will have their 3D printed accessory. Given the small size of the modeled objects, it is quite possible to do several iterations during the time allotted for the workshop.

Timing

1. Introduction and presentation of 3D printing - 15 mins

Introduction of the world of 3D printing with video (<http://www.dragontape.com/#!/6319966877908992>) and presentation.

2. Overview of the activity - 5 mins

Briefly explain the flow of steps for the day's activity.

What will the participants do? : Create an accessory for a LEGO minifigure

Which software will be used? : TinkerCAD

3. Log in each participant to the software TinkerCAD - 5 min

Ask each participant to log into the software TinkerCAD.
Provide usernames and passwords.

4. Introduction to TinkerCAD - 15 min

Facilitation plan

The facilitator will run through the entire 3D modeling process to demonstrate the software TinkerCAD.

Participants watch while the facilitator describes what they are doing.

The facilitator asks participants to follow along, up until the 3D printing step.

After launching the 3D print of the demo model, participants create their own 3D model. The facilitator moves around the room to assist and re-explain concepts as necessary. Demonstrate common questions or repeat challenging concepts to all participants. Often participants want reminders for how to select, group, and subtract objects.

Key concepts to show participants

- The workplane
- Zoom in/out (scroll)
- Rotation of the viewpoint (right-click and move mouse)
- Reset the viewpoint ("Home view" button)
- Pan view (hold shift + right-click, and move mouse)
- Sidebar with various parts and how to place them on the workplane
- The geometric primitives ("Basic Shapes" tab) available in the sidebar
- The solid vs hole state of a shape
- Selecting an object (left-click)
- Selecting multiple objects (hold shift + left-click)
- Using a selection box (hold left-click and move mouse, release left-click)
- Group / ungroup multiple objects (adding / subtracting)
- Handles for scaling and translating objects

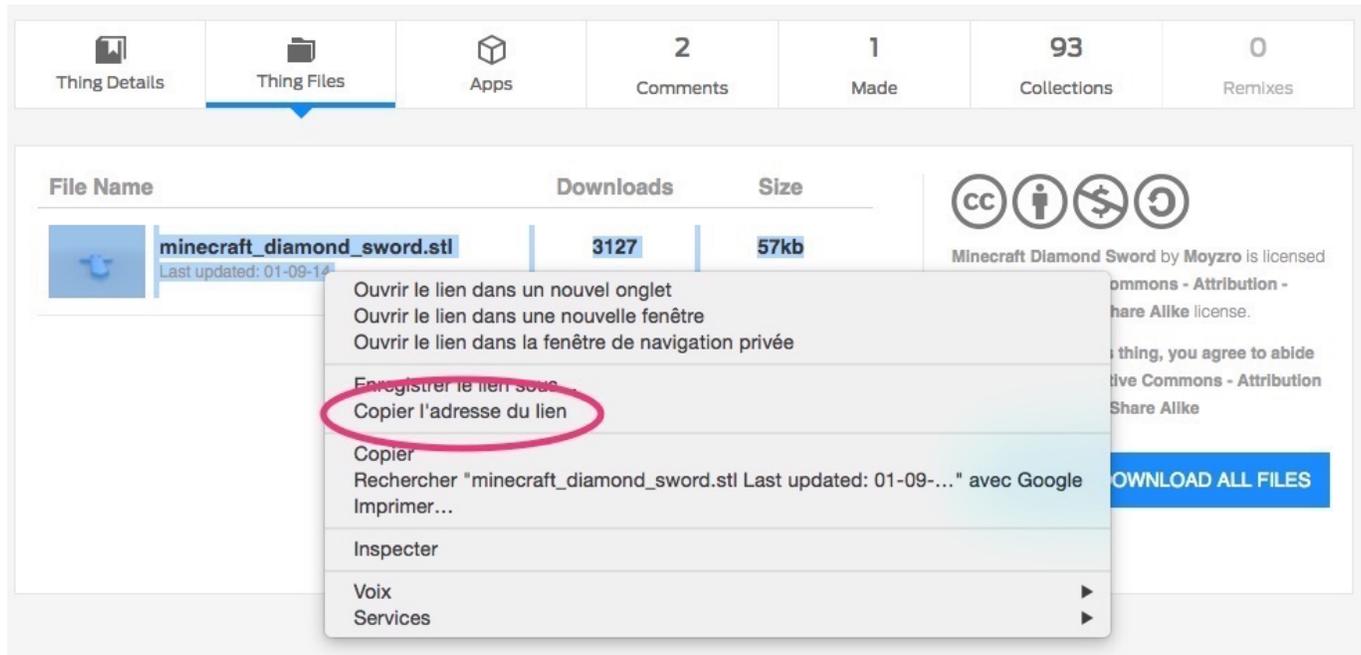
For more information, see the instructions here : [TinkerCAD](#)

5. Open Thingiverse : library of 3D models - 2min

Open (<http://www.thingiverse.com> (<http://www.thingiverse.com>) text: Thingiverse) in a new browser tab and choose an object to use as a starting point.

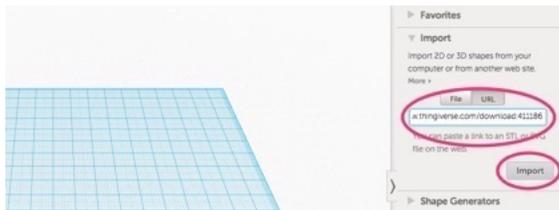
6. Search and navigate the site - 15 min

On the object's page, navigate to the tab "Thing files" and find the model of interest with the extension ".STL". Click on the STL file to download it.



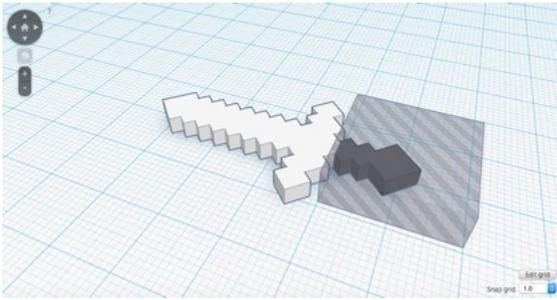
7. Import the object in TinkerCAD - 5 min

Return to TinkerCAD and find the "Import" button at the top right (on the second menu bar). Select the STL file downloaded previously or drag-and-drop it into the import window. Adjust the scale percent or dimensions as necessary and click on "Import".



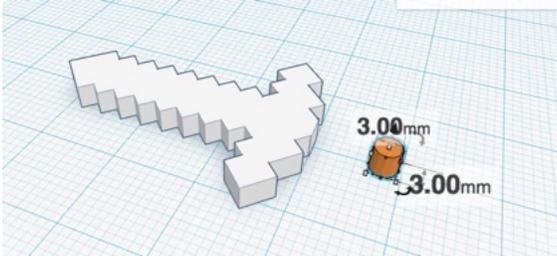
8. Remove the unnecessary parts - 2min

Remove the parts of the model which may interfere with the LEGO handle.



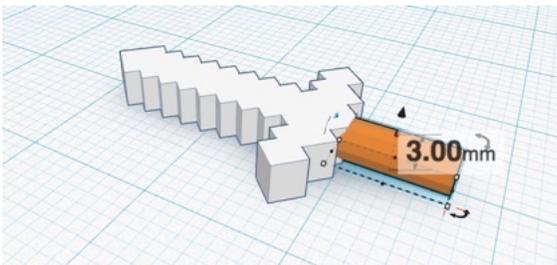
9. Create the handle

To create the handle, add a 3mm diameter cylinder.



10. Position the handle

Positioning the 3mm cylinder in the right place. At this step, also make sure that the imported object and the handle are sitting on the workplane.



11. Saving the STL file

Rename the file

- click on the nonsense name in the top menu bar and enter a new name
 - Download the STL file :
 - Export : Everything in Model, STL
- Use a USB key to gather the STL files from participants.

12. Import the files in Tinkerine or Cura - 5 min

Open the preferred slicer software

Import the STL file

Adjust the print settings (fill, wall thickness, speed, height, ...)

Save the file (.Gcode) to the SD card

13. 3D Printing - 30–45 mins

Insert the SD card in the 3D printer

Select the previously saved file (.Gcode)

Start the print!

14. Feedback - 5 min

Ask the participants to provide feedback on the workshop while the models are being printed.

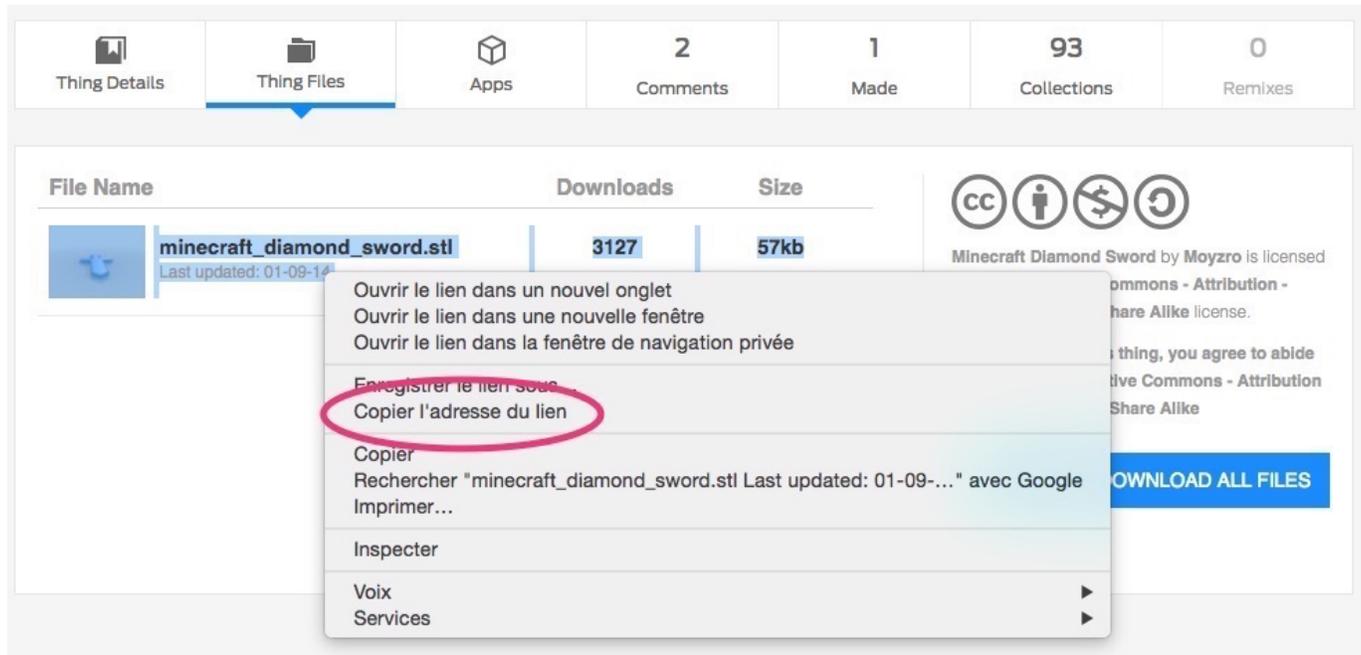
Participant's guide

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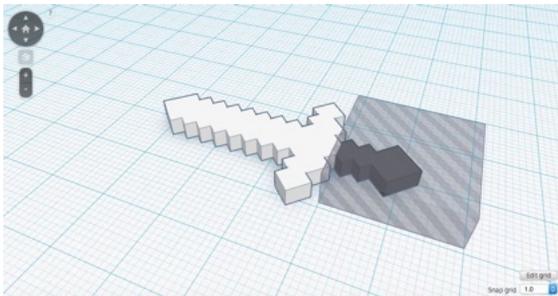


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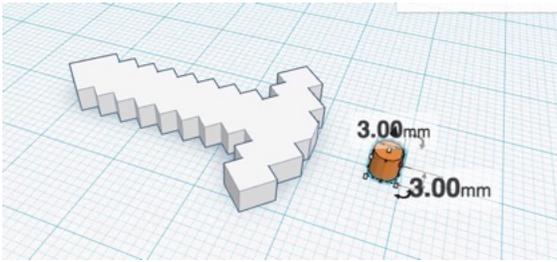
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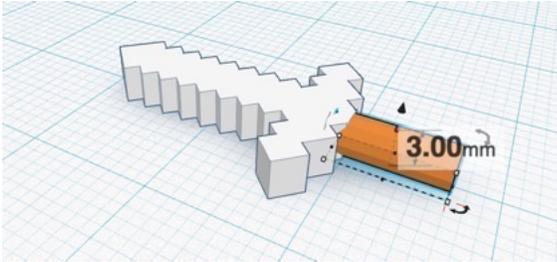
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6. Position the handle

Positioning the 3mm cylinder in the right place. At this step, also make sure that the imported object and the handle are sitting on the workplane.



7. Saving the STL file

Rename the file with your name

- click on the nonsense name in the top menu bar and enter a new name
- Download the STL file :
- Export : Everything in Model, STL