Lesson 3: How Printing Works + Design a Container

3D Printing Center - Elementary Curriculum

3D Printing Center

45 minutes

Welcome Back Designers!

Look What We Made!

Show printed keychains from Lesson 2

- **Your designs** came to life!
- **Real objects** from your ideas
- **Amazing work** everyone!

How Did This Happen?

The Printing Process Deep Dive

Today we'll learn **exactly** how your computer design became a real object!

Step 1: Slicing

Computer Cuts Your Design

- **Slicing software** cuts design into thin layers
- Like slicing a loaf of bread
- Each layer is **0.2mm thick** (thinner than paper!)
- Hundreds of layers make one object

Show slicing software if available

Step 2: Layer by Layer

The Printer Draws

- **Hot plastic** draws each layer
- **Follows the path** from slicing software
- **One layer at a time** from bottom to top
- Each layer **sticks** to the one below

Step 3: Cooling and Bonding

Layers Become Solid

- **Hot plastic cools down** quickly
- **Layers bond together** as they cool
- **Strong connection** between layers
- **Final object** is one solid piece

Stay Safe Around Printers

- **Never touch** the hot parts (200°C+!)
- **Don't reach** into printer while working
- **Tell a teacher** if something looks wrong
- **Hot end** and **heated bed** are dangerous

Design a Container

Your Mission: Create a small container for desk supplies

Think about: - What will you store in it? - How big does it need to be? - What shape works best?

Container Requirements

Design Specifications

- **Big enough** for paperclips or erasers
- **Has walls** and a bottom
- **Hollow inside** (we'll learn the "Hole" tool!)
- **Printable size** (fits on build plate)

Making Things Hollow

The "Hole" tool: - Makes shapes **subtract** instead of add - **Cuts out** material from other shapes - **Essential** for containers and hollow objects - **Group** hole with solid to make it work

Step-by-Step Container Build

Follow Along (25 minutes)

1. **Start** with cube or cylinder (5 min)
2. **Add smaller shape** inside (5 min)
3. **Make inner shape** a "Hole" (10 min)
4. **Group** them together (5 min)

Take your time - this is a new concept!

Making Great Containers

- **Walls** should be at least 2mm thick
- **Bottom** should be at least 1mm thick
- **Opening** should be big enough for your hand
- **Test** the size by measuring real objects

Common Container Issues

- **Walls too thin?** Make outer shape bigger
- **Hole not working?** Check if it's selected as "Hole"
- **Shapes not combining?** Select all and group
- **Container too small?** Measure your objects first

Problem Solving Questions

- **What problem** does your container solve?
- **Who** would use this container?
- **Where** would they keep it?
- **How** can you make it better?

Advanced Features

For Fast Finishers

- **Add decorations** to the outside
- **Create dividers** inside
- **Add your name** or label
- **Make it unique** to you

Save Your Work

Don't Lose Your Container!

1. **Name** your design clearly
2. **Download** as STL file
3. **Double-check** it saved
4. **Show** your teacher when done

Quick Gallery Walk

See Everyone's Containers

- **Walk quietly** around the room
- **Look** at different design approaches
- **Give compliments** to classmates
- **Get ideas** for improvements

What We Learned

Today's Big Ideas

- **Slicing** cuts designs into layers
- **Layer-by-layer** printing builds objects
- **Hole tool** creates hollow spaces
- **Containers** solve storage problems

Lesson 4 Preview

"Problem-Solving Design Challenge"

- Design something to solve a real problem
- Use everything you've learned
- Be creative problem solvers!

Cleanup Time!

5 Minutes to Pack Up

- **Save** your container design
- **Close** Tinkercad properly
- **Clean** your workspace
- **Put away** materials

Great job learning about printing and containers!