Introduction to
3D Printing + Design Thinking

A BEGINNER'S GUIDE: KEY TERMS AND ACTIVITIES

A **3D printer** is a special kind of printer used to create a three dimensional physical object from a digital design. It does this by building the object, one thin layer at a time. These layers are printed on a flat surface called a **print bed.**

The print head on a 3D printer moves in many different directions to create an object. It moves side to side or horizontal on the **x-axis** and up and down or vertically on the **z-axis**.

Before you can print, you need to find or create a model. You can find a lot of ready made or **open source** models for free on websites like *Thingyverse. You can also* design your own model with a CAD software program used to create three dimensional objects. **CAD** stands for Computer-Aided Design. When you find or create a model, you save it as an STL file. An **STL file** is a common file type used for 3D printing.

A 3D printer needs filament to print. **Filament** is a type of plastic that is used as a printing material. **PLA and PTEG** are two different types of filament. Filament come in many colors and are used to print a variety of different objects. The Filament is wrapped tightly around a spool and pulled into an extruder. The **extruder** is the part of a 3D printer that pushes melted plastic through the print nozzle. The **print nozzle** is the tip where the melted filament comes out. The **hotend** is the part of the printer that heats up and melts the filament before it is printed.

Next, you need to open your STL file in a program called a slicer. A **slicer** converts your 3D model into printable layers. The slicer makes a list of instructions called G-code. **G-code** is what the printer reads to make the object.

When an object is being printed, the inside is filled with something called infill. **Infill** is the pattern inside a print that gives it strength. It can be solid, like a brick, or hollow with crisscross lines or honeycomb shapes. This helps the object stay strong without using alot of plastic.
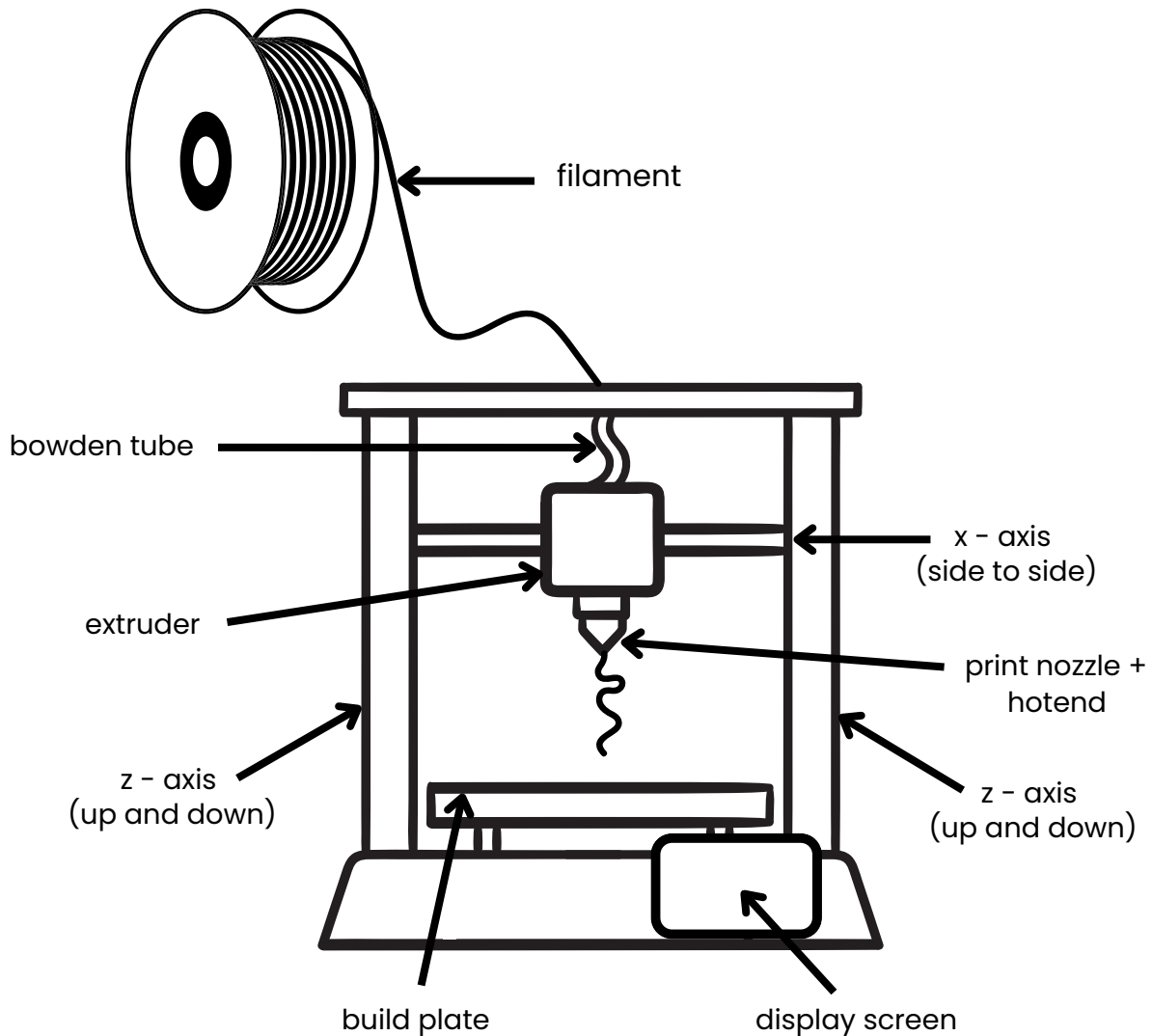
Support is extra material printed under those parts to hold them up during the build. After the object is finished, the support is removed. The printer might also add a brim. A **brim** is a thin layer that helps keep prints stuck to the bed.

Now that you've learned the basic parts and vocabulary of 3D printing, you're ready to start thinking like a maker. Remember, every great object starts with a simple idea, and with the right tools and knowledge, you can bring that idea to life, layer by layer.

Name: _____   Date: _____

Parts of a 3D Printer

USE THE GUIDE BELOW AND COLOR IN THE DIFFERENT PARTS OF THE 3D PRINTER

filament

bowden tube

x - axis
(side to side)

extruder

print nozzle +
hotend

z - axis
(up and down)

z - axis
(up and down)

build plate

display screen

bowden tube	orange	filament	purple
build plate	green	hot end	red
display	blue	x - axis	pink
extruder	yellow	z - axis	grey

Color all remaining parts of the 3D printer black

3D PRINTING WORD SEARCH

Find and circle all the 3D printing terms from the word bank hidden in the puzzle

R E G F B P V E K V B G H C D
H O T E N D R Y V G C O D E I
B A O L N K W I A R A F T H N
T U L S S O S U N O Z A Q E F
E Q C A P U Z T Q T R J D X I
Z S G F Y O P Z L F E B M T L
A C P I G E O P L B F R Y R L
X A H L B D R L O E E C S U V
I D Q A A R J E A R S D L D T
S K S M V L I R P L T E I E K
V M B E Y A A M Q U D F C R D
B E Q N Z W Q G E O X B E S I
R N Y T S E W E M C H C R O C
B Y K N G M J F C O Q A B S H

BED	HOTEND	PRINTER
BRIM	INFILL	SLICER
CAD	LAYER	SPOOL
EXTRUDER	MODEL	STL
FILAMENT	NOZZLE	SUPPORT
GCODE	PLA	ZAXIS

Name: _____   Date: _____

3D PRINTING VOCABULARY MATCH

Draw a line from each 3D printing term to its correct definition

Filament	The horizontal (side by side) direction a printer moves in
Print Nozzle	The tip where the melted filament comes out
CAD	A program that turns 3D models into printable layers
x-axis	Software used to design 3D models
Brim	The flat surface where the 3D print is built
3D Printer	Temporary material that holds up overhanging parts
STL	A thin layer that helps keep prints stuck to the bed
Print Bed	The part that pushes melted plastic through the nozzle
Support	The pattern inside a print that makes it solid or hollow
Extruder	The spool of plastic used as printing material
Hotend	The vertical (up and down) direction a printer moves in
Infill	The digital shape you create and send to the printer
Layer	The machine that can print a physical 3D object
G-code	A common file type used for 3D printing
Model	Instructions the printer reads to make the object
Slicer	Heats up and melts the filament before it's printed
z-axis	A thin level of the print; prints are made layer by layer

Name: _____   Date: _____

3D PRINTING + DESIGN THINKING ACTIVITY

Search and Explore
What keywords did you use to search?

_____

_____

_____

Pick a Color
What color do you want your object to be?
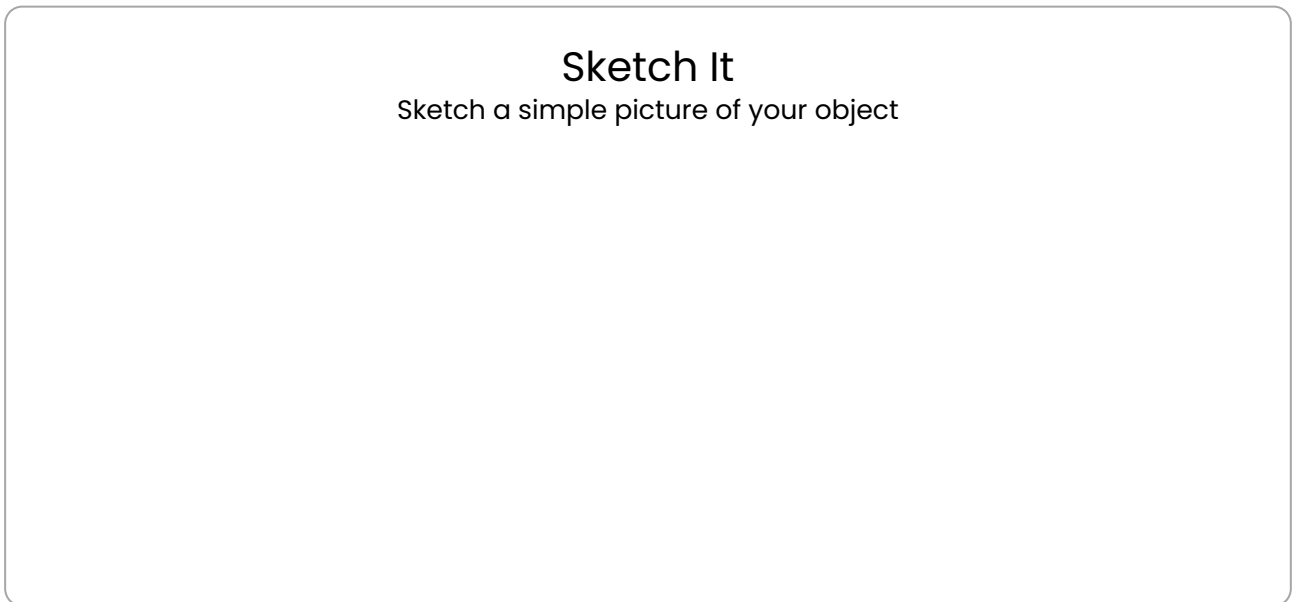
_____

_____

Your Object Name
What is the exact name of your object on Thingiverse?

_____

Your "Why"
Why did you choose this object? What does it mean to you? What do you plan to do with it?

_____

_____

_____

Sketch It
Sketch a simple picture of your object

Name: _____   Date: _____

BEAT-MAKING + DESIGN THINKING ACTIVITY

Your Partners Name
Write your partners first name below.

_____

Pick a Genre
What genre did you choose?

_____

Drum Pack
Which drum pack did you choose?

_____

_____

Sample Pack
Which sample pack did you choose?

_____

_____

What Does it Sound Like?
Choose a couple words to describe your beat.

_____

_____

What Does it Feel Like?
If your beat were a mood, what would it be?

_____

_____

Name Your Beat
What did you name your beat?

_____

Story Behind the Beat
What is the story behind this beat? What/Who inspired it? What do you hope people feel when they hear it?

_____

_____

_____

What Do You See?
What kind of visuals do you imagine when you hear your beat?

_____