HoW tO bAkE a ZeRo CaLoRiE cAkE

DISCLAIMER: This project involves no actual coding, so it may sound like it will be a quick and fun design project. BLENDER HAS A STEEP LEARNING CURVE. You must have some level of patience and a desire to learn more about blender. But hopefully given sufficient hours watching tutorials and struggling through it, we can make a tasty (or at least remotely edible) looking cake. PLEASE save often and in ways that you can revert back to stages if something goes wrong.

1. Download the latest version of Blender from blender.org
2. Obtain a mouse with a scroll wheel (or change settings – see "Tips and Controls" section below), or go to room 110 (but don't take the mouse just use the computer).
3. Watch Blender Beginner tutorial part 1-7 by Blender Guru on YouTube. The majority of the cake can be done using parts 1-4, but watching parts 5-7 will be useful for creating things like sprinkles etc.) (Motivation: if you follow along your donut could even be a decoration on the cake, or build your cake as you go instead of a donut!)
https://www.youtube.com/watch?v=JYj6e-72RDs
   Note: The PDF which he mentions with very helpful keyboard shortcuts is located here https://s3.amazonaws.com/ezs3ac34a26aa3f5ce6650303da779cb7c9b/Blender+Guru/BlenderGuru_KeyboardShortcutGuide_v2.pdf (You're welcome I sacrificed my email and first born for that.)
4. Follow along with our walkthrough (below) to make your very first birthday candle! Feel free to utilize your artistic license, but the final result should be at least as detailed as ours. Note that these directions assume basic knowledge from the tutorials.
5. Apply what you have learned from the donut tutorial to building a 0 calorie cake. It can be square, or circular. Additionally:
   a) This cake should include at least:One layer that has colored frosting and is the appropriate material - not too shiny, not too dull.
      i.   3 or more candles that are lit.
      ii.   One decoration (such as sprinkles).
      iii. A table or a platter that it is served on top of.
   b) Other things you could do to extend this scene but that are not required:
      i. Add a fork and knife
      ii. Add extra layers to the cake

iii.   Take a slice out of the cake (it will be easier to plan for this in the beginning, rather than after the cake and frosting have been completed).

6. **What to turn in:** Render the image using OpenGL (go up to the top left corner under render select OpenGL and you should get a nice picture). Takes a screenshot of this and submit along with your saved .blend file!

Steps to build a candle:

1. Press Shift-a to add an object.
2. Pick an object closest to the candle shape (e.g. a cylinder).
3. Don't click away from the cylinder yet! There should be a menu on the bottom left that has vertices, radius and depth. Change these fields so that the object is shaped to be candle-like.
4. Press tab to enter object mode.
5. Select the top circle of vertices. Press e to extrude them slightly upwards.
6. Press s to scale the circle to be smaller, and then g-z to move them down to form a dip at the top of the candle.
7. Repeat steps 1-3 to make a wick (scaled down appropriately).
8. Move the wick to rest in the the top center of the candle.
9. Follow the instructions of the first blender guru tutorial (towards the end of the first he shows how to light a monkey's face on fire) to set the wick on fire. Be sure to scale the fire-box to be around the top half of the wick, as that box is what controls which part of the image will be on fire. When changing smoke to fire make sure you have the object selected.
10. Add a new material to the candle, and select a fun color for your candle!
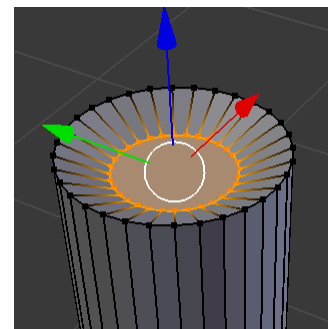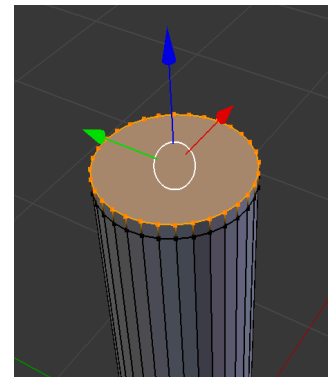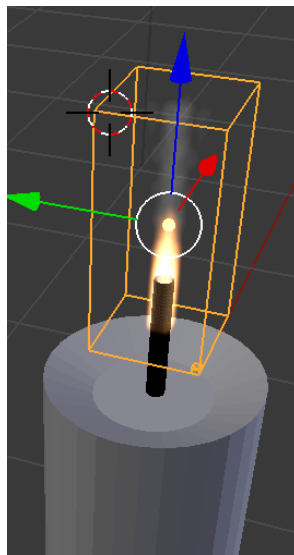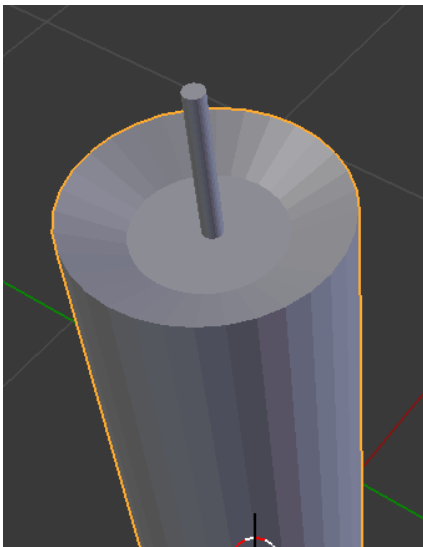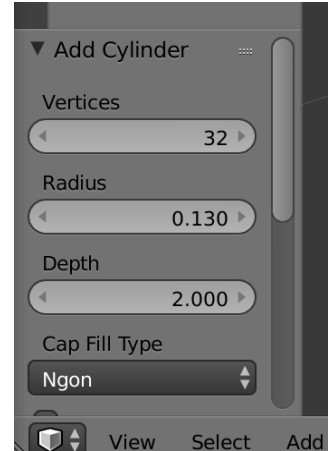
Tips and controls:

- If you don't have a numpad, go to File -> User Preferences -> Input and check box to "Emulate Numpad." This will allow number keys to work as you would expect. Similarly, if you do not have access to a mouse with a scroll wheel, you can click the setting to "Emulate 3 Button Mouse." MAKE SURE TO SAVE USER SETTINGS BEFORE EXITING PREFERENCES. (Note: If selecting objects with right click is too weird for you, you may also switch to select with left click here too.)
- If everything goes wrong, you can go to File -> New to restore the defaults!
- If you have a mouse with a scroll wheel, you can rotate the camera by pressing and holding the scroll button. If you also hold shift, you can change the position of the view.
- Pressing space allows you to search for additional shortcuts, etc.
- Important note: Blender Guru is using windows blender, so you may encounter differences between his view and yours if you're on a Mac (or if you use a different version). For example, when adding a new material, his screen shows a surface category, but this (or at least my) version splits it into diffuse/specular. Changing the diffuse will set the main color.

Helpful YouTube Timestamps:

- Part 1. Blender Guru Tutorial
    - 0:00 - 5:00   Introduction and setup
    - 5:00 - 12:00   Moving and selecting
    - 12:00 - 13:27 Adding a new object
    - 13:27 - 15:30 Lighting the monkey on fire

- Part 2. Moving, Rotating, and Scaling
    - 1:00 - 5:00   Adding and scaling objects
    - 5:00 - 9:00   View and moving
    - 9:00 - 12:15   Rotating and scaling (again)
    - 12:00 - 14:50 Modifiers and doing things you can change
    - 14:50 - end   Donut doing the worm

- Part 3. Manipulating Objects, Edit mode, and Frosting
    - 3:00 - 5:00   Entering edit mode
    - 4:30 - 16:34   Selecting/moving/scaling/editing vertices
    - 16:34 - 29:44 Adding frosting
    - 29:44 - end   Copying items (Tower of donuts)

- Part 4. Material Nodes, Changing Texture and Color
    - 1:00-8:30   Rendering
    - 8:30- 13:27   Setting material/color/texture
    - 13:27 - 25:40 Adding icing
    - 33:40 - 37:00 Icing "dripping"
    - 37:00 - end   Radioactive donut

The remaining videos are important for certain specific things, but since they don't have too many techniques you will need to refer back to, time stamps aren't included.

- Part 5. Modeling: how to make a custom object
    - How to make a coffee mug
    - Important for making a custom items.

- Part 6. Textures
    - Could be useful for creating a table texture.
    - This will also show you how to make a plate.

- Part 7. Particles
    - Shows you how to create sprinkles!