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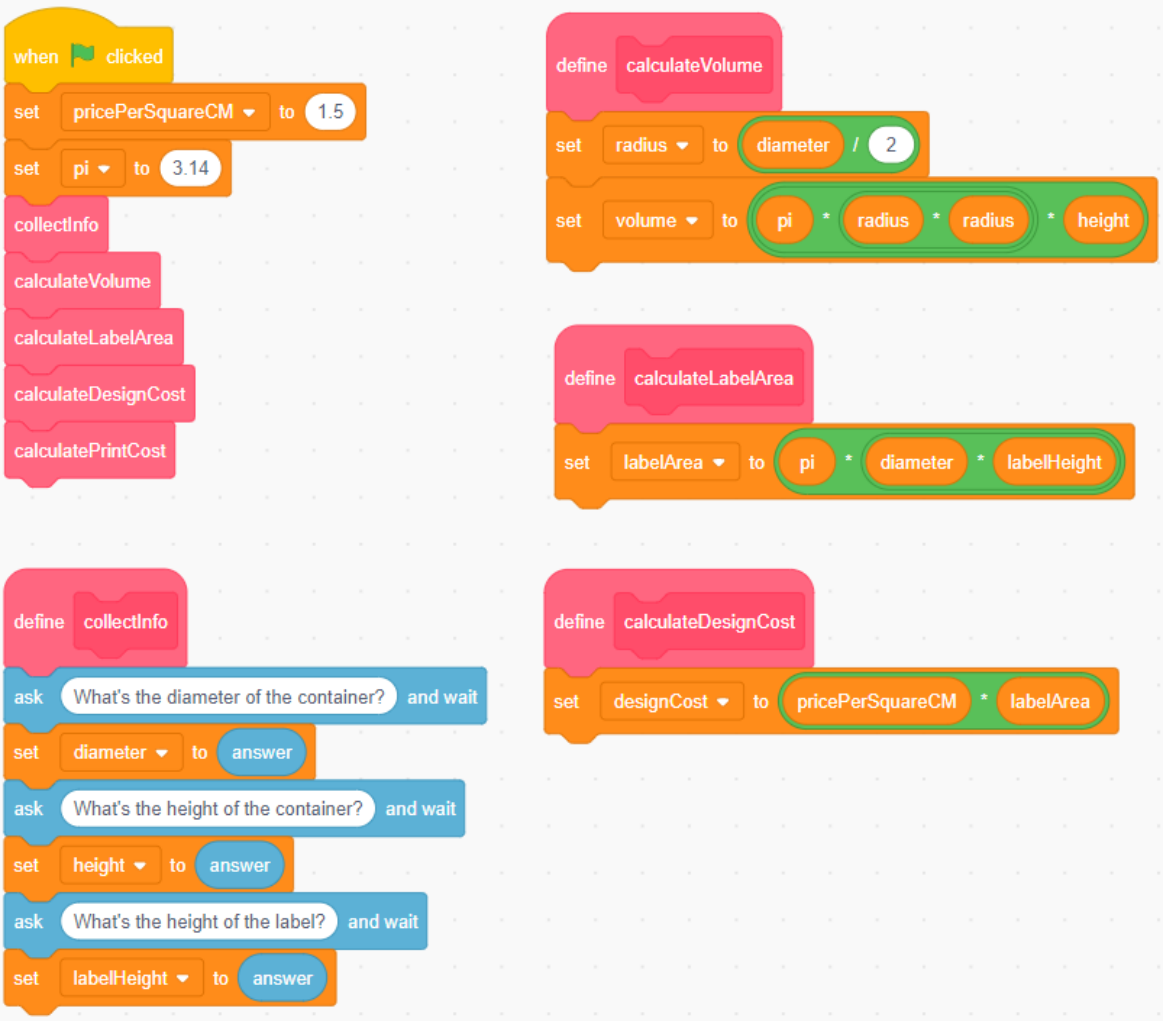
Yindi's Labels—Design Quote

Check out the Design Quote application created in Scratch here:
https://scratch.mit.edu/projects/718910000/editor/

If you have a Scratch login, save the project in your Scratch account by selecting Remix at the top of the screen.
A login is not required to work with the code, but you will not be able to save your changes without it.

The code is shown below:



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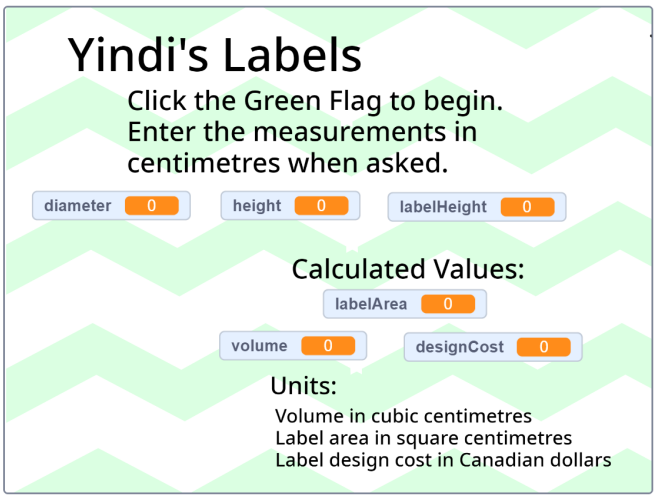
Yindi's Labels—Design Quote (cont'd)

Because the label may be shorter than the container,
Yindi requests both the container height and label height.

The user clicks on the green flag (), then types the diameter, height, and label height in centimetres in response to the questions.

The dimensions as well as the container volume, area of the label, and cost to design the label are displayed on the stage.



Yindi used subprograms to collect data from the client, and to calculate the volume, the area of the label, and the cost to design it.

Coding Vocabulary Check

Pseudocode is an informal way of describing a computer program; computer programmers, or coders, often use pseudocode when planning their programs.

A ***subprogram*** is a set of instructions for completing a specific task; a subprogram can be referenced and called to action by the main program to accomplish a large task using small steps.

In coding, a ***variable*** has a value that may change throughout a program and may include text, characters, or numbers.

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Yindi's Labels—Design Quote (cont'd)

Here is the pseudocode for this application:

```
subprogram collectInfo
    ask for the container diameter
    ask for the container height
    ask for the label height


subprogram calculateVolume
    radius = diameter / 2
    volume = pi * radius * radius * height
    display volume


subprogram calculateLabelArea
    labelArea =  pi * diameter * labelHeight
    display labelArea


subprogram calculateLabelCost
    labelCost = pricePerSquareCM * labelArea
    display labelCost


#Main program
pricePerSquareCM = 1.50
pi = 3.14
    run subprogram collectInfo
    run subprogram calculateVolume
    run subprogram calculateLabelArea
    run subprogram calculateLabelCost
```


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Yindi's Labels—Design Quote (cont'd)

Use the pseudocode and/or the Scratch application to answer the questions below.

1. The client enters a height and label height of 10 cm, and a diameter of 6.5 cm.
   What volume, label area, and label design cost are displayed?
2. A client is deciding between these dimensions for a cylindrical jar.
   - diameter: 8 cm; height: 11.8 cm; label height: 6.8 cm
   - diameter: 7.4 cm; height: 13.5 cm; label height: 8.5 cm

   a) How do the volumes of the jars compare?
   b) Which jar would have a cheaper label design cost?
3. Yindi changes their label design pricing to $\$1.25/cm^2$.
   How would you alter the code to reflect this change?
4. Suppose Yindi changes the first question asked so the user inputs the radius instead of the diameter.
   How would the pseudocode be altered to reflect this change?
5. Yindi adds two subprograms as described below.
   Write code for the two subprograms.
   a) to calculate the surface area of the top of the cylindrical container
   b) to calculate the cost of designing a circular sticker for the top of the container

   If you want some help, check out the Hints below.

Hints:

- Write the pseudocode before coding in Scratch
- You will need to include two more variables; call them **topSA** and **topStickerCost**.
- Call the subprograms you create: **calculateTopSA; calculateTopStickerCost**.

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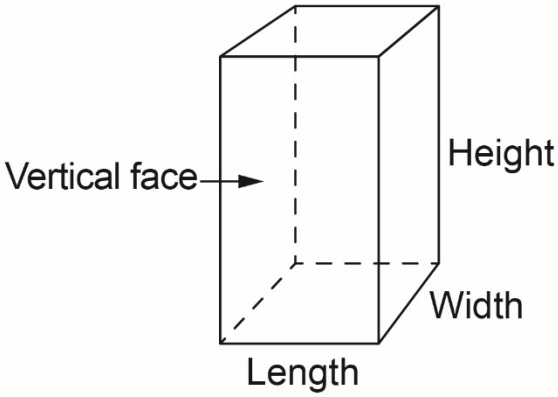
Yindi's Labels—Design Quote (cont'd)

Extensions:

- Have a character "say" the label design cost with a speech bubble:

- Alter the code to ensure the **designCost** variable only contains two decimal places. This is trickier than it sounds!
- Measure the diameter, height, and label height of some grocery items packaged in cans or other cylindrical containers.
  Use the app to verify that the volume is large enough to hold the amount of product specified on the label. (*Hint:* 1 cm^3 = 1 mL)
  How much would Yindi charge to design a label for each product?
- Create an application to calculate the volume of a rectangular prism. Determine the cost to design a label that can be wrapped around the four faces (not the top and bottom faces).



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