Learning Goals:
- learn to use different variable types
- learn about type conversions
- learn to do more advanced calculations
- import libraries and call functions
- learn to format output
- use constants

What to hand in:
- Hand all of the following in using Git. For details on how to use Git, please see "How to submit labs and assignments" on the course page (csci.viu.ca/~carruths/Courses/CSCI160)
  - Lab2Prelab.pdf
    - Due night before your lab (by 23:59)
  - Lab2Checklist.pdf
    - Due: 23:59, three days following your assigned lab section (i.e. Tuesday Lab is due Friday, Thursday Lab is due Sunday)
  - Lab2.cpp
    - Due: 23:59, three days following your assigned lab section (i.e. Tuesday Lab is due Friday, Thursday Lab is due Sunday)
- Note:
  - late submissions will be penalized 20% per day, and will not be marked after 3 days in order that solutions can be posted in a timely manner
  - All work must be individual. Plagiarized work will result in a mark of 0. Further penalties may apply.

Marking Scheme:
- Prelab is completed on time – 1 mark
- All files meet given specifications and requirements – 6 marks
- Code readability and comments – 2 marks
- Self-assessment is consistent with quality of work – 1 marks

Part 1:
In lab, we will write a C++ program that will let the user compute the amount of fabric needed to cover a cone-shaped tree. To see an example: https://www.gardeningknowhow.com/plant-problems/environmental/wrapping-plants-in-burlap.htm.

To do so, the program will prompt the user to input the following values:
- A floating point value for the tree's height
- A floating point value for the tree's radius at the base

These values should be saved in the appropriate typed and named variables.

The program will then compute:
- The surface area of the tree:
  - PI × radius × (length + radius)

- To compute this, we need to compute the length of the cone:
  - Length = √ (radius^2 + height^2)

- In order to compute the square of a value in C++, we can use the function pow(base, exponent).
- In order to compute the square root of a value in C++, we can use the function sqrt(base, exponent).

Output the following to the user:
- The radius they entered, formatted with 2 values to the right of the decimal and the units
- The height of the tree, formatted with 2 values to the right of the decimal and the units
- The total surface area of fabric needed, formatted with 2 values to the right of the decimal and the units

Part 2:
On your own, you will add the following functionality to your program

Declare a constant that will hold the width of the fabric that is being used. Fabric comes in a fixed width, so this value won't change. The width will be a whole number and should be stored in an integer.

The program will then compute:
- The length of fabric needed to get the surface area needed above.

To do so, you'll need to use the following formula:
$$\text{Fabric length} = (\text{surface area needed}) \div \text{width}$$

Output the following to the user:
- The width of the fabric
- The length of fabric needed, rounded up to the nearest integer, and output as an integer, with the units

Specifications:
Your lab2.cpp program will
- Describe what the program will do
- Prompt the user to enter the height of the tree
- Prompt the user to enter a radius of the tree
- Output the user-entered value to the user
- Calculate and output the surface area of the tree
- Output the width of the fabric
- Calculate and output the length of fabric needed, as an integer
- Floating point outputs will have exactly 2 digits to the right of the decimal
- Terminate safely

Requirements:
- Code compiles and runs with no warnings
- Code terminates safely (no crashes)
- Code compiles with no errors

Code Readability and Comments:

- header comment includes:
  - name of author
  - name of program
  - brief description of purpose of program
- Brief comment for all variable declarations
- Brief comment for all logical blocks
- Layout:
  - correct placement of braces
- Correct naming conventions followed
- Appropriate use of constants

Bonus:

- Compute and output how much fabric can be saved if you buy all the fabric at once to cover 10 trees of the same size (should get savings due to rounding errors).

Assumptions:

- No error checking is required
- All values entered by the user are positive (>0)