```c
// J Hundley
// assign03.c
// February 12, 2015
/*
a) You can use trigonometry to find the height of a building.
   Suppose you measure the angle between the line of sight
   and the horizontal line connecting the measuring point and the building.
   You can calculate the height of the building with the following formulas:
            tan(theta)=h/d        h=d/tan(theta)
   Assume that the distance to the building alone the ground is 120 meters
   and the angle measured alone the line of sight is 30 degrees plus/minus 3
   degrees.
   Ask the user to enter an angle 30 degrees plus/minus 3 degrees.
   If the angle is too small or too large, write a message.
   else compute and print the height of the building.
*/

#include <stdio.h>
#include <math.h>

//*****CONSTANT*****
#define MAX_ANGLE  33.0 // degrees
#define MIN_ANGLE  27.0 // degrees
#define DISTANCE   120.0 // meters
#define PI         3.14159

int main()
{
   double degrees,
          radians,
          height;  // meters
//*****INPUT*****
// get the angle between the line of sight and
// the horizontal line connecting the measuring point and the building
   printf( "Enter an angle in degrees (min=%.1f, max=%.1f): ", MIN_ANGLE, MAX_ANGLE );
   scanf( "%lf", &degrees );
// if the angle is too small
   if ( degrees < MIN_ANGLE )
   // print a message
      printf( "%.1f is too small.", degrees );
// else if the angle is too large
   else if ( degrees > MAX_ANGLE )
   // print a message
      printf( "%.1f is too large.", degrees );
// else compute and print height
   else
   {
   //*****COMPUTATION*****
   // convert degrees to radians
   // find the height of the building
      radians = degrees * (PI/180);
      height  = DISTANCE * tan(radians);

   //*****OUTPUT*****
   // print the degrees and height of the building
      printf( "Using %.1f degrees, the building height is %.2f meters. \n", degrees, height );
   }

   return 0;
}
```

*Read all instructions
before beginning your work.*

Before you start writing your program:
Read these instructions including the development plan. A development plan is a
process that guides you through solving a problem and creating an algorithm. The algorithm has been added as comments to a
guide you when writing the C program file solution for the following problem. Modify the identifying comments and other
comments as needed to solve the problem presented in these instructions.

Program: **assign03.c**
Problem:
Trigonometry can be used to find the height of a building. Suppose you measure the angle between the line of sight and the
horizontal line connecting the measuring point and the building. You can calculate the height of the building with the following
formulas:

$$\tan(\theta) = h/d \qquad h = d * \tan(\theta)$$

Assume that the distance to the building along the ground is 120 meters and the angle measured along the line of sight is 30
degrees plus/minus 3 degrees. Ask the user to enter an angle within the given range. If the angle is too small or too large, write an
appropriate message. Else, find and print the height of the building.

Write one C program that computes and displays the results of each part above.
Modify the identifying comments and other comments as needed to solve the problem presented in these instructions.

Problem Constants:
```
MAX_ANGLE  33.0  // degrees
MIN_ANGLE  27.0
DISTANCE   120.0  // meters
PI         3.14159
```

Problem Inputs:
angle in degrees

Problem Outputs:
height of building in meters

Other variables:
angle in radians   See `tan()` and `atan2()`.

Equations:
radians = theta * (pi/180)
height =

Instructions:
- ☐ See Standards for Documentation of C Programs on the Resources page on Canvas.
- ☐ Insert comments at the top and throughout each file.
  - o Include the follow comments at the beginning of this (and ALL) files.
    - `//` submitter's name, **GROUP #**   **Grade of ZERO for files with submitter name not part of Canvas group**
    - `//` other group members' names   **Type "none" if submitting alone.**
    - `//` assignment number   **Zero points for comments if no collaboration statement**
    - `//` date you completed the assignment
    - `//` **statement(s) about collaboration**
    - `//` a short narrative about what the file does
  - o Use the algorithm given as comments throughout your program.

- ☐ Use descriptive variable names.
- ☐ Use Sample Input/Output as a guide.
- ☐ Use **Generate CSD** to ensure correct indenting.
- ☐ Represent ALL given values as constants.
- ☐ Format the angle with 1 decimal place.
- ☐ Format the building height with 2 decimal places.
- ☐ Label output using the `printf()` function in sentence form.
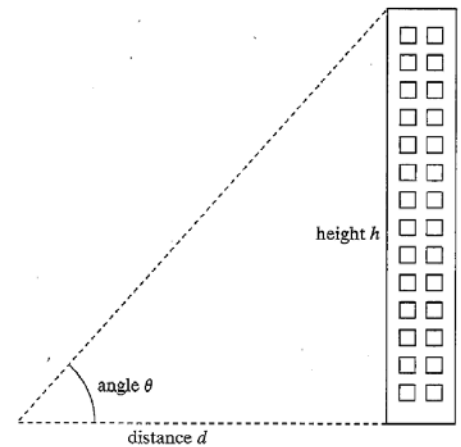
Sample Output:

> Run 1:
>> Enter an angle between 27.0 and 33.0 degrees: 50
>> 50.0 is too large.
>
> Run 2:
>> Enter an angle between 27.0 and 33.0 degrees: 20
>> 20.0 is too small.
>
> Run 3:
>> Enter an angle between 27.0 and 33.0 degrees: 29.5
>> Using 29.5 degrees, the building height is 67.89 meters.

Submit via Canvas:
> assign03.c   C program file

Your .m script file should begin by typing the following statements into your empty editor window.
- Write your/your group information on the `//` lines.
- <u>Copy and paste</u> the other lines as a guide when writing the C instructions to do the tasks to solve the given problems.

```
// submitter's name, GROUP #
// other group members' names
// assignment number
// date you completed the assignment
// statement(s) about collaboration
// a short narrative about what the file does

#include <stdio.h>
#include <math.h>

//*****CONSTANT*****
#define MAX_ANGLE  33.0   // degrees
#define MIN_ANGLE  27.0   // degrees
#define DISTANCE  120.0   // meters
#define PI         3.14159

int main()
{
   double               // variables with units

//*****INPUT*****
// get the angle between the line of sight and
// the horizontal line connecting the measuring point and the building

// if the angle is too small
   // print a message
// else if the angle is too large
   // print a message
// else compute and print height
   //*****COMPUTATION*****
   // convert degrees to radians
   // find the building height
   //*****OUTPUT*****
   // print the degrees and building height

      return 0;
   }

   Take time to observe the difference in using 33 & 27 and 33.0 & 27.0 when running your assign03.
   #define MAX_ANGLE  33.0   // degrees
   #define MIN_ANGLE  27.0   // degrees
```