Arithmetic Expressions and Math Class Projects

1. **Math:**

A. Write a program that calculates the following for a given number (must handle both double and integers):

Square root
Power
Absolute Value
Is it an even or an odd integer
The number Squared

Ask the user for the double and for the integer. Take the input from the user, perform the requested operations and display the result to the user.

Then Ask them for another set of numbers, a double and an integer. Then, using the appropriate math methods (when applicaple), perform the following and DISPLAY the results (do on both integers and doubles):

compare the doubles and display the larger one

produce the sum

produce the product

produce the difference

produce the quotient

B. Pythagorean theorem (MSU #11)

Ask the user for the lengths of the two sides of a right Triangle

Calculate and display the Hypotenuse

Example: 3 & 4 yields 5

C. **Add a function that calculates the length of sides and angels for a given Right Triangle**

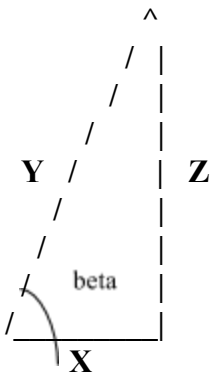
Given the length of one side, the opposite side, and the length of one angle, beta, calculate and display the remaining angle, alpha, along with the remaining two sides, adjacent and hypotenuse

For extra credit, prove your results by applying them to the Pythagorean Theorem (H^2 = A^2 + O^2)
If the numbers ARE CLOSE, then your answers are correct

Be sure to display all answers to the user

Ask the user for the length of the side, Z
Then ask for the angle of beta

Then calculate and display the results
For example:



User enters:

Beta = 36
Z = 4

You calculate:

Alpha = 54
Y = 6.81
X = 5.51

Proof:

X^2 + Z^2 = Y^2
46.3601 aprox 46.3761

D. **Ask the user for the Radius of a circle and calculate and display the following for the circle:**

Circumference

Diameter

Area

Use Math.PI or a constant variable for 3.14159

Diameter = 2r
Circumference = 2PI r
Area = PI r^2

You must code your program using one of the following 2 methods:

1. **CREATE STATIC FUNCTIONS FOR EACH OPERATION. PASS THE USER INPUT TO THE FUNCTION AND RETURN THE RESULT TO MAIN.**

ALL RESULTS MUST BE DISPLAYED FROM MAIN !!!

2. **CREATE A CLASS AND CREATE PRIVATE ATTRIBUTES AND A CONSTRUCTOR THAT CAN SET THEIR VALUES BASED ON USER INPUT**

ALL RESULTS MUST BE DISPLAYED FROM MAIN !!!

2. **Fahrenheit to/from Celsius:**

Write a program that asks the user for a degree to convert. Then display the resulting Celsius value.

Extra Credit: figure out how to ask the user WHICH conversion they want (Far to Cel OR cel to Far) and then perform the requested operation

celsius = Fahrenheit minus 32 and that result multiplied by 5 and then that result divided by 9

3. Jogging Distance (MSU # 8)

Calculate the distance a person jogged given their AVERAGE strides per minute and the total hours and minutes they jogged

The persons stride is 2.5 feet

There are 5,280 feet per mile

Example:
Please Enter Your AVERAGE Strides per Minute: 40
Please Enter total HOURS and THEN Minutes Jogged: 1 15

You Jogged 1.42045 Miles Today!

4. Square Meters to Mow (MSU #5)

Calculate how long it will take someone to mow a lawn given the length and width of the house and the length and width of the yard

A person can mow 2 square meters per second

Example:
Please Enter Length and THEN the Width of the Yard (in Meters): 100 100
Please Enter Length and THEN the Width of the House (in Meters): 20 10

It will Take You 81.6667 Minutes to Mow the Yard

5. Population Growth (MSU #12)

Given an initial insect population and the population after 1 week,
Calculate the growth rate along with the estimated second week population

Example:
Please Enter Initial and 1st Week Insect Population: 10000 15000

Growth Rate is 50 %
The Second Week Size Will Be 22500

6. BMI (litvin p.169)

Compute a persons Body Mass Index (BMI)

Ask the user for their weight (pounds) and height (inches)

BMI = kilograms divided by the square of the height as expressed in meters

1 inch = .0254 meters

1 pound = .454 kilograms

7. Dog years to human years (litvin p.170)

Convert a dogs age to the corresponding human age

The dogs first year = 13 human years

After the first dog year, every 3 dog years = 16 human years

Display the human age ROUNDED to the nearest integer

Example:

Dog Years 10

Approximate Human Years 61

9. Income tax calculator (lambert comp p.72)

Compute a person's imcome tax

HERE IS THE RELEVANT TAX LAW:

The flat tax rate is 20%
There is a $1,000 standard deduction
There is a $2,000 deduction per dependant
Express both Gross Salary and Tax Amount to the penny

The user inputs their gross salary and the number of dependants

You apply the tax law and display the amount of taxes the user owes

Example:

Enter your Gross Salary: 50000.50
Enter the Number of Dependants: 4

You Taxes Are: $ 8200.10