

1. **Compute the Hypotenuse**<sup>1</sup>: Write a function that takes the lengths of the two shorter sides of a right triangle as its parameters. Return the hypotenuse of the triangle, computed using Pythagorean theorem, as the function's result. Read the lengths of the shorter sides of a right triangle from the user and use your function to compute the length of the hypotenuse, and display the result.
2. **Taxi Fare**<sup>1</sup>: In a particular jurisdiction, taxi fares consist of a base fare of \$4.00, plus \$0.25 for every 140 meters traveled. Write a function that takes the distance traveled (in kilometers) as its only parameter and returns the total fare as its only result.

Hint: Taxi fares change over time. Use constants to represent the base fare and the variable portion of the fare so that the program can be updated easily when the rates increase.

3. **Shipping Calculator**<sup>1</sup>: An online retailer provides express shipping for many of its items at a rate of \$10.95 for the first item, and \$2.95 for each subsequent item. Write a function that takes the number of items in the order as its only parameter. Return the shipping charge for the order as the function's result.
4. **Median of Three Values**<sup>1</sup>: Write a function that takes three numbers as parameters, and returns the median value of those parameters as its result.

Hint: The median value is the middle of the three values when they are sorted into ascending order. It can be found using if statements, or with a little bit of mathematical creativity.

5. **Is a Number Prime?**<sup>1</sup>: A prime number is an integer greater than 1 that is only divisible by one and itself. Write a function that determines whether or not its parameter is prime, returning True if it is, and False otherwise. Write a program that reads an integer from the user and displays a message indicating whether or not it is prime.
6. **Next Prime**<sup>1</sup>: In this exercise you will create a function named `next_prime` that finds and returns the first prime number larger than some integer, *n*. The value of *n* will be passed to the function as its only parameter. Write a program that reads an integer from the user and displays the first prime number larger than the entered value. Ideally, import and use your solution to Exercise 5 while completing this exercise.
7. **Reduce a Fraction to Lowest Terms**<sup>1</sup>: Write a function that takes two positive integers that represent the numerator and denominator of a fraction as its only two parameters. The body of the function should reduce the fraction to lowest terms and then prints both the numerator and denominator of the reduced fraction. For example, if the parameters passed to the function are 6 and 63 then the function should print 2 and 21. Write a program that allows the user to enter a numerator and denominator. Then your program should display the reduced fraction.

Hint: In the past we wrote a program for computing the greatest common divisor of two positive integers. You may find that code useful when completing this exercise.

8. **The Collatz Sequence**<sup>2</sup>: Write a function named `collatz()` that has one parameter named `number`. If `number` is even, then `collatz()` should print `number // 2` and return this value. If `number` is odd, then `collatz()` should print and return `3 * number + 1`. Then write a program that lets the user type in an integer and that keeps calling `collatz()` on

that number until the function returns the value 1. (Amazingly enough, this sequence actually works for any integer — sooner or later, using this sequence, you'll arrive at 1! Even mathematicians aren't sure why. Your program is exploring what's called the *Collatz sequence*, sometimes called “the simplest impossible math problem.”) Remember to convert the return value from `input()` to an integer with the `int()` function; otherwise, it will be a string value.

Hint: The output of this program could look something like this:

```
Enter number:
3
10
5
16
8
4
2
1
```

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1 - Ben Stephenson, *The Python Workbook*,

2 - Al Sweigart, *Automate The Boring Stuff With Python*.