Python Scarlett's Speed Converter

Time required: 60 minutes

- Comment each line of code as shown in the tutorials and other code examples.
- Follow all directions carefully and accurately.
- Think of the directions as minimum requirements.

Pseudocode

1. Write pseudocode for the exercise
2. Submit with the assignment

Requirements

Congratulations, you've got a job as a junior developer at Scarlett's Space Travel Agency. "We can take you where no one has been before." She would like a program to convert various speed measurements.

Speed is a unit of measurement over an amount of time, the rate at which an object covers a certain distance.

Your program will prompt the user for a floating-point value representing miles/hour. You will reprint that value along with that value converted to the following values:

- Kilometers per hour
- Barleycorns per day
- Furlongs per fortnight
- Mach number
- Percentage of the speed of light
- Hours of flight to reach the moon

You can find these measures and conversions on the web. We will use the conversion factors listed below. Always convert from the original user input.

- A Kilometer is a metric measurement of distance:
  K = mph x 1.60934, where M is miles per hour

- A Barleycorn is a (very old) English measure of length:
  Barleycorns per Day = (mph x 189334.58824) * 24
- A Furlong is measure of distance, 220 yards. A Fortnight is a measure of time, 2 weeks.
  Furlongs per Fortnight = mph * 2687.99
- The Mach number is a measure of speed, the percentage of the speed of sound. Mach 1 is a speed equal to the speed of sound in air, which is 767.269 mph
  Mach number = mph / 767.269
- PSL is a speed, the percentage of the speed of light in a vacuum. The speed of light is 299,792,458 meters/second or 670,616,629 miles per hour.
  PSL = mph / 670,616,629
- Days of flight to reach the moon, 240,000 miles / mph / 24.0

Convert Math Formula to Python Code

The following are some examples of how to convert a math formula to Python code. This should give you enough to do the rest on your own.

```
# Miles to Kilometers
K = M x 1.60934
# Miles to Barleycorns
B = M x 189334.58824
```

These are math formulas, not Python formulas. Let's convert these to Python code. Remember the order of precedence. Use parentheses to be clear about the order of operations. We want float math; we will use floats for our operations.

```
# Miles to Kilometers
K = M x 1.60934
# Python code
kilometers_per_hour = miles_per_hour * 1.60934
# Miles per hour to Barleycorns per day
B = (mph x 189334.58824) * 24
# Python code
barleycorns_per_day = (miles_per_hour * 189334.58824) * 24
```

1. Create a Python program named **speed_converter.py** that gets float input from the user and prints out the information shown.
2. Comment each line of code.

TODO Outline of Program

You can use the following TODO outline to get started with your program.

```
"""
    Filename: speed_converter.py
    Author:
    Created:
    Purpose: Get mph as a float
    Calculate conversions
"""

# TODO: Print creative program title

# TODO: Get miles per hour input as float

# TODO: Echo user input

# TODO: Calculate and display Kilometers per hour to 3 decimal places

# TODO: Calculate and display Barleycorns per day to 3 decimal places

# TODO: Calculate and display Furlongs per Fortnight to 3 decimal places

# TODO: Calculate and display Mach number to 15 decimal places

# TODO: Calculate and display PSL, percentage of the speed of light
# to 15 decimal places

# TODO: How many days to reach the moon, 3 decimal places
```

F-strings formatting example:

```
print(f" Kilometers per hour:          {kph:,.3f}")
```

```
: indicates formatting codes are coming up
, comma formats 1,000 separators
.3f formats a float to 3 decimal places
```

Example runs:

```
+=====================================================+
|     ---    Scarlet's Speed Converter     ---        |
+=====================================================+
Enter miles per hour: 1
Speed in miles per hour:       1.0 mph
Kilometers per hour:           1.609
Barleycorns per day:           4,544,030.118
Furlongs per fortnight:        2,687.990
Mach number:                   0.001303323866858
Percentage of speed of light: 0.000000001491165
Days to reach the moon:        10,000.000
```

```
+=====================================================+
|     ---    Scarlet's Speed Converter     ---        |
+=====================================================+
Enter miles per hour: 100.5
Speed in miles per hour:       100.5 mph
Kilometers per hour:           161.739
Barleycorns per day:           456,675,026.835
Furlongs per fortnight:        270,142.995
Mach number:                   0.130984048619194
Percentage of speed of light: 0.000000149862076
Days to reach the moon:        99.502
```

```
+=====================================================+
|     ---    Scarlet's Speed Converter     ---        |
+=====================================================+
Enter miles per hour: 800.25
Speed in miles per hour:       800.25 mph
Kilometers per hour:           1,287.874
Barleycorns per day:           3,636,360,101.737
Furlongs per fortnight:        2,151,063.998
Mach number:                   1.042984924452832
Percentage of speed of light: 0.000001193304737
Days to reach the moon:        12.496
```

Assignment Submission

1. Attach the pseudocode.
2. Attach the program files.
3. Attach screenshots showing the successful operation of the program.
4. Submit in Blackboard.