1. In the vain hope of achieving everlasting immortality (at least amongst mathematicians), Peter has made his own Collatz-style conjecture:

Consider an arbitrary integer r.

- If r is divisible by 2, then divide it by 2.
- Otherwise, assign r the value of $(r + 3) \times 2$

Peter proposes that – just like with the Collatz Conjecture – if you start with any arbitrary positive integer and repeatedly keep applying the above rule, then you will eventually reach 1.

Write a Python program to experimentally investigate this by implementing the above rule as a function *petersRule*, then starting with an initial value of 10 use a loop to repeatedly apply the function on the result, printing out the value at each iteration of the loop. In case Peter's conjecture doesn't work, you should ensure that the loop iterates no more than 27 times. Finally, print a message stating whether or not a value of 1 was reached, and how many iterations of the loop it took (if the value of 1 wasn't reached, then say that).

2. In the vain hope of achieving everlasting immortality (at least amongst mathematicians), Peter has made his own Collatz-style conjecture:

Consider an arbitrary integer p.

- If p is divisible by 4, then divide it by 4.
- Otherwise, assign p the value of $4 \times p \times 3$

Peter proposes that – just like with the Collatz Conjecture – if you start with any arbitrary positive integer and repeatedly keep applying the above rule, then you will eventually reach 1.

Write a Python program to experimentally investigate this by implementing the above rule as a function *petersRule*, then starting with an initial value of 9 use a loop to repeatedly apply the function on the result, printing out the value at each iteration of the loop. In case Peter's conjecture doesn't work, you should ensure that the loop iterates no more than 25 times. Finally, print a message stating whether or not a value of 1 was reached, and how many iterations of the loop it took (if the value of 1 wasn't reached, then say that).

3. In the vain hope of achieving everlasting immortality (at least amongst mathematicians), Peter has made his own Collatz-style conjecture:

Consider an arbitrary integer n.

- If n is divisible by 2, then divide it by 2.
- Otherwise, assign n the value of $(3 + n) \times 2$

Peter proposes that – just like with the Collatz Conjecture – if you start with any arbitrary positive integer and repeatedly keep applying the above rule, then you will eventually reach 1.

Write a Python program to experimentally investigate this by implementing the above rule as a function *petersRule*, then starting with an initial value of 5 use a loop to repeatedly apply the function on the result, printing out the value at each iteration of the loop. In case Peter's conjecture doesn't work, you should ensure that the loop iterates no more than 24 times. Finally, print a message stating whether or not a value of 1 was reached, and how many iterations of the loop it took (if the value of 1 wasn't reached, then say that).