ABOUT THE % OPERATOR: CALLED MODULUS

- ***THIS OPERATOR RETURNS THE REMAINDER OF TWO NUMBERS.***

  FOR INSTANCE 10 % 3 IS 1
  BECAUSE 10 DIVIDED BY 3 LEAVES A REMAINDER OF 1

  YOU MAY REMEMBER WHEN WE FIRST LEARNED ABOUT DIVISION,
  WE WORKED WITH INTEGERS AND REMAINDERS,
  NOT DECIMAL FRACTIONS.

  THE MODULUS OPERATOR % SYMBOLIZES INTEGER DIVISION, BUT RETURNS THE REMAINDER, NOT THE QUOTIENT.
  BELOW SHOWS 4 IS THE QUOTIENT, 2 IS THE REMAINDER, SO THAT:

  14 % 3 = 2 (WITH 2 BEING THE REMAINDER OF THE DIVISION)

WHY USING IT?

MODULUS IS USEFUL IN ALL KINDS OF SCENARIOS, ONE OF WHICH IS DETERMINING DIVISIBILITY.

- IF A % B == 0 THEN A IS EVENLY DIVISIBLE BY B.
- IT IS ALSO USEFUL FOR OPEN-ENDED COUNTING
- WHERE WE REPEAT A PATTERN EVERY SO MANY TICKS.

NOTE THE FOLLOWING:

14 / 3 = 4.666... => 4 + 0.666...
0.666... * 3 APPROACHES TO 2
14 – (4 * 3) = 2

- *FORTUNATELY, WE DON'T HAVE TO FUSS WITH DECIMAL VALUES, ONLY INTEGER REMAINDERS.*
- *DIVIDEND MINUS QUOTIENT TIMES MODULUS EQUALS MODULO*
- *THE DIVISOR IN A MODULAR EXPRESSION IS THE MODULUS.*
- *THE REMAINDER IN A MODULAR EXPRESSION IS THE MODULO.*

WHY DOES 2 MOD 4 = 2?

REMAINDER OF INTEGER DIVISION

BECAUSE 2 = 0 * 4 + 2

- *IN X/Y RESULTS CONSISTS OF AN INTEGER PART AND A FRACTION PART.*
- *IF YOU MULTIPLY THE FRACTION PART WITH THE DIVISOR, YOU GET THE REMAINDER. AND X = INTEGER PARTY + REMAINDER (I.E. FRACTION PARTY).*
- *IN THIS CASE INTEGER PART IS 0, AND THE REMAINDER IS 2.*

IMPORTANT NOTES:

2 % 5 = 2	ITSELF (REMAINDER OF INTEGER DIVISION) DO THE DIVISION 2/5 = 0.4 THEN 2 - [0 * (RESULT) * 5 (THE MODULUS)] = 2
2 % 2 = 0	ANY NUMBER MODULUS ITSELF IS ZERO DO THE DIVISION 2/2 = 1 THEN 2 - (1 * 2) = 0
2 % 1 = 0	ANY NUMBER MODULUS 1 IS ZERO DO THE DIVISION 2/1 = 2 THEN 2 - (2*1) = 0

EXAMPLE:

I. SO, 54 % 23 MEANS SUBTRACT 23 FROM 54 YOU GET 31.
II. THEN 31 IS GREATER
III. THAN 23 WE CONTINUE TO SUBTRACT 23 FROM 31 AGAIN
IV. SUBTRACT 31 - 23 AND RESULT IS NOW 8. SO 8 IS LESS THAN 24 AND WE STOP.
V. HENCE, 8 IS THE REMAINDER.