

Math

Addition

- If Sally has 24 apples and Sam gives Sally 47 more apples, how many apples does Sally have?

- $24 + 47$

- To store the results (integer in this case):

$$\text{total_apples} = 24 + 47$$

- NOT


$$24 + 47 = \text{total_apples}$$

Subtraction

- If Sally has 37 apples and she gives Sam 18 of them, how many apples does Sally have?
- $37 - 18$
- To store the results (integer in this case):

$\text{total_apples} = 37 - 18$

- NOT

~~$37 - 18 = \text{total_apples}$~~

Multiplication: *

- If a table has 3 rows and 5 columns, how many individual cells are there?
- $3 * 5$
- To store the results (integer in this case):

$\text{total_cells} = 3 * 5$

- NOT:

~~$3 * 5 = \text{total_cells}$~~

Division: /

- If you drove 365 miles on one full tank of gas, and your gas tank holds 15 gallons, how many miles per gallon does your car get?

- $365 / 15$

- To store the result (floating-point number in this case):

$\text{miles_per_gallon} = 365 / 15$

- NOT

~~$365 / 15 = \text{miles_per_gallon}$~~

Floor division: //

- How many dollar bills could you get if you had 127 nickels?
- $127 // 20$
- To store the result (always an integer):
dollars = $127 // 20$

• NOT:

~~$127 // 20 = \text{dollars}$~~

Remainder: %

- If you get as many dollar bills as possible for your 127 nickels, how many nickels will you have left?
- $127 \% 20$
- To store the result (always an integer):

nickels = $127 \% 20$

- NOT:

~~$127 \% 20 = \text{nickels}$~~

Power: **

- How many unique decimal numbers (base 10) can be represented by a 3 digit binary number?
- $2^{**} 3$
- To store the result (always a floating point number):
- `unique_numbers = 2 ** 3`
- NOT:
 ~~$2^{**} 3 = \text{unique_numbers}$~~

Memory Model

- $a = 3$ Assigns 3 to a memory space and stores the address in a
- $b = 6$ Assigns 6 to a memory space and stores the address in b
- $x = a + b$ Gets the number stored in the address found in a and the number stored in the address held in b, adds them together and stores them in a memory space. It then stores the address of that memory space in x

Drawing it out (board)

- $a = 3$
- $b = 6$
- $x = a + b$

Order of operations

Evaluate left to right

1. Exponentiation: $**$
2. Multiplication, division, and remainder: $*$, $/$, $\%$
3. Addition and subtraction: $+$, $-$

Evaluate right to left

4. Assignment

What is stored in x in the following statement?

$$x = 5 + 6 * 4 - 2 * 6 / 3 + 10 \% 3$$

Problems

- Average the numbers 3, 10, -5, 12
- Calculate the hypotenuse of a right triangle whose sides are 3 and 8
- What is the kinetic energy of a 2 kg mass with a 6.5 m/sec velocity? The formula is: $K.E. = \frac{1}{2} mv^2$ where m is mass and v is velocity

Testing

- Always test your programs!
- For sequential programs, run them and check to make sure that the correct answer is given.

Watch out for ...

- Typos
- Lines of code in the wrong order (using a variable before assigning a number to it)
- Incorrect order of operations

Accumulators



basket = 0

Combination Operators

Combination

basket += 5

basket -= 5

basket *= 5

basket /= 5

basket %= 5

Same as

basket = basket + 5

basket = basket - 5

basket = basket * 5

basket = basket / 5

basket = basket % 5