

Maths in Python

Like all programming languages, maths plays a significant part. Today we explore maths operators and functions that use maths in our code.

Addition / Subtraction Operator

Incrementing a variable by 1 (increase by 1)

```
cycles = 0

cycles = cycles + 1

print(cycles)
```

We can shorten this code using an “**augmented assignment operator**”.

```
cycles = 0

cycles += 1

print(cycles)
```

Similarly, we can decrement a variable (decrease) by 1

```
cycles = 10

#cycles = cycles - 1
cycles -= 1

print(cycles)
```

Multiplication / Division Operator

Increasing by 3 times

```
cycles = 4

#cycles = cycles * 3
cycles *= 3

print(cycles)
```

Finally dividing by 2;

```
cycles = 5

#cycles = cycles / 2
cycles /= 2

print(cycles)
```

Exponents

The power of 2

```
cycles = 5

#cycles = cycles ** 2
cycles **= 2

print(cycles)
```

Modulus

Modulus gives you the remainder of any division – often used to find out if a number is even or odd. Modulus 2 will always be zero for an even number and 1 for odd.

```
cycles = 11

remainder = cycles % 3

print(remainder)
```

Functions

Include **round**, **absolute**, **power**, **max** and **min**.

```
x = 3.51
y = -4
z = 7

#result = round(x)      # <-- rounds x to nearest integer (4)
#result = abs(y)       # <-- distance of the number from zero
                        # as a whole (4)
#result = pow(8, 2)    # <-- sets result to 8^2 (64)
#result = max(x, y, z) # <-- sets result to largest var. (7)
#result = min(x, y, z) # <-- sets result to smallest var. (-4)

print(result)
```

Classes – The Maths Class

We can import the 'math' module to obtain some very useful constants and functions.

For instance, if we need to use the value of π

```
import math
print(math.pi)      # <-- outputs the value of pi
```

Other mathematical operations include:

```
import math
x = 9.6
# -- find the square root of x
#result = math.sqrt(x)
# -- round value of x up to the ceiling, 9.6 -> 10
#result = math.ceil(x)
# <-- rounds value of x down to the floor, 9.6 -> 9
#result = math.floor(x)
print(result)
```

Finding the circumference of a circle uses formula $Circumference = 2 \times \pi \times Radius$.

```
import math
radius = float(input("Enter the radius of the circle: "))
circumference = 2 * math.pi * radius
#print(f"The circumference of the circle is {circumference}")
# -- to round off to three decimal places
print(f"The circumference of the circle is
{round(circumference, 3)}")
```

Exercise 1

Write code to calculate the area of a circle – ask the user for the radius of the circle.

(Area = $\pi \times r^2$) – ensure the result is given to 2 decimal places.

Exercise 2

Find the length of the hypotenuse of a right angled triangle after asking your user to provide the length of side a and side b. (round the answer to 2 decimal places.)

hint: $c = \sqrt{a^2 + b^2}$