

MATH FUNCTIONS

Python has a set of built-in math functions, including an extensive math module, that allows you to perform mathematical tasks on numbers.

Math Build in Functions

1. The `min()` and `max()` functions can be used to find the lowest or highest value in an iterable.

Example

```
x = min(5, 10, 25)  
y = max(5, 10, 25)
```

```
print(x)
```

Output 5

```
print(y)
```

Output 25

2. The `abs()` function returns the absolute (positive) value of the specified number:

Example

```
x = abs(-7.25)
print(x)          7.25
```

3. The `pow(x, y)` function returns the value of x to the power of y (x^y).

Example

```
x = pow(4, 3)
```

Return the value of 4 to the power of 3 (same as $4 * 4 * 4$):

```
print(x)
```

The Math Module

- Python has also a built-in module called math, which extends the list of mathematical functions.
- To use it, you must import the math module:

`import math`

- When you have imported the math module, you can start using methods and constants of the module.

4. The `math.sqrt()` method for example, returns the square root of a number:

- Example

```
import math
```

```
x = math.sqrt(64)
```

```
print(x)
```

5. The `math.ceil()` method rounds a number upwards to its nearest integer, and the `math.floor()` method rounds a number downwards to its nearest integer, and returns the result:

Example

```
import math
x = math.ceil(1.4)
y = math.floor(1.4)
print(x) # returns 2
print(y) # returns 1
```

6. The `math.pi` constant, returns the value of PI (3.14...):

Example

```
import math  
x = math.pi  
print(x)
```

output 3.142.

Write a python program to calculate the area and circumference of circle.

```
import math  
radius = 2  
x = math.pi  
Areaof_circle = radius**2*x  
print(area)
```

Write a python program to calculate the circumference of circle.

Example

```
import math
radius = 2
x = math.pi
Area_of_circumference = 2*radius*x
print(Area_of_circumference)
```

Python Math Trigonometric Functions

- All the trigonometric functions are available in python math module, so you can easily calculate them using `sin()`, `cos()`, `tan()`, `acos()`, `asin()`, `atan()` etc functions.
- Also, you can convert angles from degree to radian and radian to degree. See the example code.

Example

```
# app.py
```

```
import math
```

```
angleInDegree = 90
```

```
angleInRadian = math.radians(angleInDegree)
```

```
print('The given angle is :', angleInRadian)
```

```
print('sin(x) is :', math.sin(angleInRadian))
```

```
print('cos(x) is :', math.cos(angleInRadian))
```

```
print('tan(x) is :', math.tan(angleInRadian))
```

A terminal window with a dark background and light green text. The window title is 'krunal@Krunals-MacBook-Air: ~/Desktop/code/pyt'. The prompt is 'pyt'. The command 'python3 app.py' has been executed. The output is: 'The given angle is : 1.5707963267948966', 'sin(x) is : 1.0', 'cos(x) is : 6.123233995736766e-17', and 'tan(x) is : 1.633123935319537e+16'. The prompt 'pyt' is followed by a cursor.

```
krunal@Krunals-MacBook-Air: ~/Desktop/code/pyt  
→ pyt python3 app.py  
The given angle is : 1.5707963267948966  
sin(x) is : 1.0  
cos(x) is : 6.123233995736766e-17  
tan(x) is : 1.633123935319537e+16  
→ pyt
```

Convert the mathematical expression into a valid python code.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

```
import math
```

```
b=5
```

```
a=3
```

```
C=5
```

```
-b+(math.sqrt(b**2)-(4*a*c))/2*a
```

```
-b-(math.sqrt(b**2)-(4*a*c))/2*a
```


Exercise

- Write a python program to calculate the area of trapezium and display the output on the computer screen. $\text{Area} = \frac{1}{2}(a+b) \times h$
- Write a python program that calculate the area of sector and display your output on the computer screen. $\text{Area} = \frac{1}{2} \times r^2 \times \theta$

Take $\theta = 90$.

- Write a python program that calculate the area of Triangle and display your output on the computer screen.

$\text{Area} = \frac{1}{2} \times b \times h$

b = base

h = vertical height

- Transform the mathematical expression in a valid python code

$$a^2 + b^2 = c^2$$