The math module is one of the most important modules in Python. This module provides extensive functionality for working with numbers.

math.ceil(X) - Rounding up to the next higher number.

math.copysign(X, Y) - returns a number that has the same modulus as X, and the same sign as Y.

math.fabs(X) - modulo X.

math.factorial(X) - factorial of X.

math.floor(X) - round down.

math.fmod(X, Y) - remainder after dividing X by Y.

math.frexp(X) - Returns the mantissa and exponent of a number.

math.ldexp(X, I) - X * 2i. The inverse of math.frexp().

math.fsum(sequence) - the sum of all members of the sequence. Equivalent to the built-in sum() function, but math.fsum() is more accurate for floating point numbers.

math.isfinite(X) - is X a number.

math.isinf(X) - is X infinity.

math.isnan(X) - is X NaN (Not a Number - not a number).

math.modf(X) - returns the fractional and integer part of the number X. Both numbers have the same sign as X.

math.trunc(X) - truncates the value of X to an integer.

math.exp(X)-e^X.

math.expm1(X) - eX - 1. As X → 0, more accurate than math.exp(X)-1.

math log(X, [base]) - logarithm of X to base base. If base is not specified, the natural logarithm is calculated.

math.log1p(X) is the natural logarithm of (1 + X). As X → 0, it is more accurate than math.log(1+X).

math.log10(X) - base 10 logarithm of X.

math.log2(X) - base 2 logarithm of X. math.pow(X,

Y) - X^Y.

math.sqrt(X) is the square root of X.

math.acos(X) is the arc cosine of X. In

radians. math.asin(X) - arcsine of X. In

radians.

math.atan(X) - arc tangent of X. In radians.

math.atan2(Y, X) - arc tangent of Y/X. in radians. Given the quarter in which the point (X, Y) is located.

math cos(X) - cosine of X (X is specified in radians).

math.sin(X) - the sine of X (X is specified in radians).

math.tan(X) - tangent of X (X is specified in radians).

math.hypot(X, Y) - calculates the hypotenuse of a triangle with legs X and Y (math.sqrt(x * x + y * y)).

math.degrees(X) - Converts radians to degrees.

math.radians(X) - Converts degrees to radians.

math.cosh(X) - calculates the hyperbolic cosine.

math.sinh(X) - Calculates the hyperbolic sine.

math.tanh(X) - calculates the hyperbolic tangent.

math.acosh(X) - Calculates the inverse hyperbolic cosine.

math.asinh(X) - Calculates the inverse hyperbolic sine. math.atanh(X) - Calculates the inverse hyperbolic tangent. math.erf(X) - error function.

math.erfc(X) - additional error function (1 - math.erf(X)).

math.gamma(X) is the gamma function of X.

math lgamma(X) is the natural logarithm of the gamma function X.

math.pi- pi = 3.1415926...

math.e- e = 2.718281...

An example of using some functions:import

math

```
# raising the number 2 to the power
of 3 n1 = math.pow(2,3)
print(n1)#8

# the same operation can be done like this n2 =2**3
print(n2)
```

```
# square root of a
numberprint(math.sqrt(9))#3

# nearest largest
integerprint(math.ceil(4.56)) # 5

# nearest smallest integerprint(math
floor(4.56)) # four

# conversion from radians to
degreesprint(math.degrees(3.14159))#18
0

# conversion from degrees to
radiansprint(math.radians(180)) #
3.1415.....
# cosineprint(math.cos(math.radians(60)))
# 0.5 #
sineprint(math.sin(math.radians(90))) # 1.0
# tangentprint(math.tan(math.radians(0)))
                                                # 0.0

print(math.log(eight,2)) # 3.0
print(math.log10(100))       # 2.0
```

The math module also provides a number of built-in constants, such as PI and E:

```
import math
radius =thirty
# area of a circle with radius 30 area =
math.pi * math.pow(radius,2)print(area)

# natural logarithm of 10 number =
math.log(ten, math.e)print(number)
```

Independent work

Write a program that would evaluate the given arithmetic expression given the given variables. Variables are entered from the keyboard. Output the result with 2 decimal places.

one)

$$S = \frac{(a^2 + b)h}{2(a-b)+4}$$

2)

$$H = \frac{\sqrt{\cos 2y + \sin 4y + \sqrt{e^x + e^{-x}}}}{(e^{-x} + e^x)^3 (\sin 4y + \cos 2y - 2)^2}$$

3)

1)	$(x^y)^x + x^{x^y} - x^4$	при $x=2,\ y=1$
2)	$\sqrt[3]{\lvert ctg\, y + 6\rvert} + \sqrt{\frac{(x+1)^3}{4y-2z}}$	при $x=1,\ y=4,\ z=3$
3)	$\frac{5xy}{x^3-4} + \exp(x^2) + \sqrt{\cos^2 y - y^2}$	при $x=3,\ y=0.2$
4)	$\sqrt{\lvert y\rvert} + \frac{arctg^3 \ln x}{x^y - y + 1}$	при $x=3,\ y=5$
1)	$4^{xy} - x^{yz} + (xy)^z$	при $x=3,\ y=1,\ z=2$
2)	$\frac{4\lvert x\rvert - xyz^2}{x + \exp(yx) - 2yz}$	при $x=2,\ y=2,\ z=1$
3)	$\sqrt[5]{\frac{1 - x + arcctg(x-7y)}{4xz - \ln^2 y}}$	при $x=0.8,\ y=0.1,\ z=4$
4)	$\frac{2\cdot 3\cdot 4}{\sin^3 x + tg^3 y} - \sqrt{z^{x-y}}$	при $x=3,\ y=1,\ z=3$
1)	$\frac{\ln(x-3)^4 + 2^x \sin^2 3x}{4x - 5.2}$	при $x=4$
2)	$\sqrt{0.6xyz} + (y^x)^2 - \exp(\sin 2x^2)$	при $x=2,\ y=2,\ z=1$
3)	$\frac{\arcsin x^3 - 6}{8(\cos 4y - \sin 4x)}$	при $x=0.5,\ y=2$
4)	$\frac{\lvert \ln x^3\rvert + \exp(2x)}{x + 3.4} - ctg^3 \frac{3}{xyz}$	при $x=2,\ y=1,\ z=3$

2. Find the area and perimeter of a right triangle given two legs.

The area of a right triangle is equal to half the area of a rectangle whose sides are equal to the lengths of the legs.
The perimeter is found by adding the lengths of all sides of a triangle. Since only the legs are known, the hypotenuse is calculated using the Pythagorean theorem:

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

To calculate the square root in Python, you can use the sqrt() function from the math module.

2. Find the roots of a quadratic equation

The quadratic equation is ax2 + bx +

c = 0

When solving it, the discriminant is first calculated by the formula D = b2

- 4ac

If D > 0, then the quadratic equation has two roots; if D = 0, then 1 root; and if D < 0, then they conclude that there are no roots.

Thus, a program for finding the roots of a quadratic equation can have three branches of the conditional operator.

The float() function converts the argument passed to it to a real number.

3. Find the area of a rectangle, triangle or circle

Depending on what the user chooses, calculate the area of either a rectangle, a triangle, or a circle. If a rectangle or triangle is selected, then it is necessary to request the lengths of the sides, if a circle, then its radius.
The area of the triangle is calculated by the Heron formula:

$$S = \sqrt{p(p-a)(p-b)(p-c)}$$

, where p is a semiperimeter, a, b, c are the lengths of the sides. The half-meter is equal to half of the perimeter, that is, half of the sum of the sides.

The area of a rectangle is equal to the product of its sides. The area of the circle is calculated by the formula S = πr2.