Integer Division in Python.
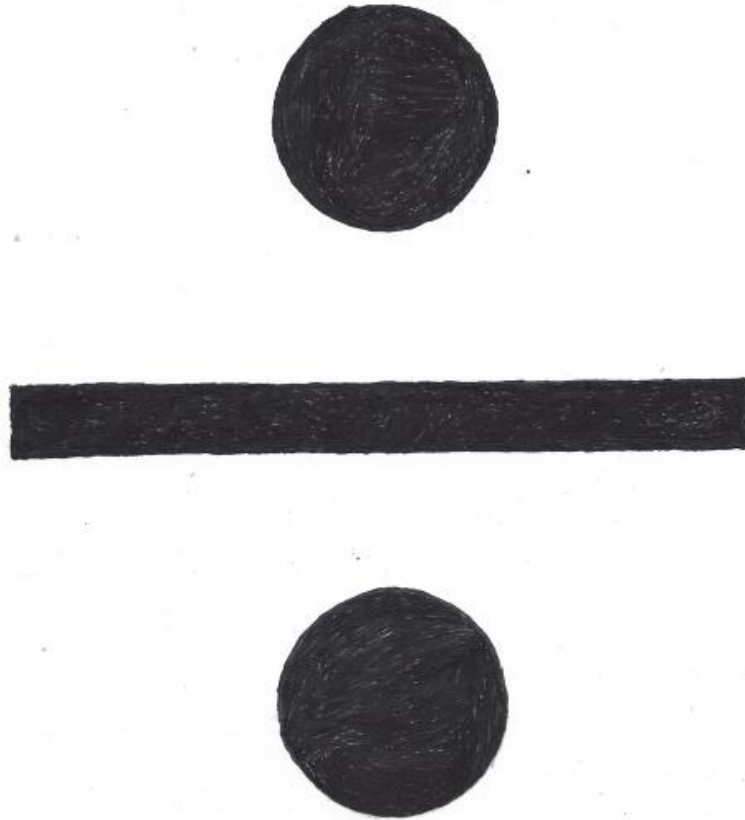

Figure 1: The Division symbol, or Obelus. This symbol is used as a Division Operator in Mathematics, but not as a Division Operator in programming languages such as Python.

WHAT GOES ON, ARITHMETICALLY, IN DIVISION?

Division, in Arithmetic, is one of the four elementary operations. We ought to examine what occurs, arithmetically, in integer division.

$$8 \div 4 = 2$$

. We pronounce the above equation, in English, as:

Eight divided by four is equal to two.

In the above equation, the integer, 8, is the dividend. The integer, 8, is what is being *divided up* 4 ways. I looked up the word 'division' in a Latin dictionary[1], and its transliterated equivalent gave:

'to distribute,'

as a definition. 8 elements, the dividend, is being *distributed* amongst 4 sets, leaving 2 elements – the quotient – in each set.

At the end of the financial year, a portion of a company's profits is *divided up* between the company's shareholders. This money that is divided up is termed a 'dividend.' The term, 'dividend,' comes from the Latin gerundive phrase, 'dividendum est,' which means 'that which must be divided.' In the above equation, it is the integer, 8, *that must be divided*.

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[1] **dīvīsiō ōnis**, f
[VID-], a division, distribution…
Latin English Lexicon: Optimized for the Kindle, Thomas McCarthy,
(Perilingua Language Tools: 2013) Version 2.1 Loc 32190
See GLOSSARY

In the above equation, the:

$$\div$$

symbol is termed 'the division operator.' To restate: 'operator' is Latin for 'worker.' It is the division operator that facilitates the 'operation' or 'work' of division. In Python, we use the:

$$/$$

, or forward-slash symbol, as a division operator. In Python, the division operator is known as a 'binary operator' as it takes two operands. The operands, in question, are:

$$8$$

, the dividend, and:

$$4$$

, the divisor.

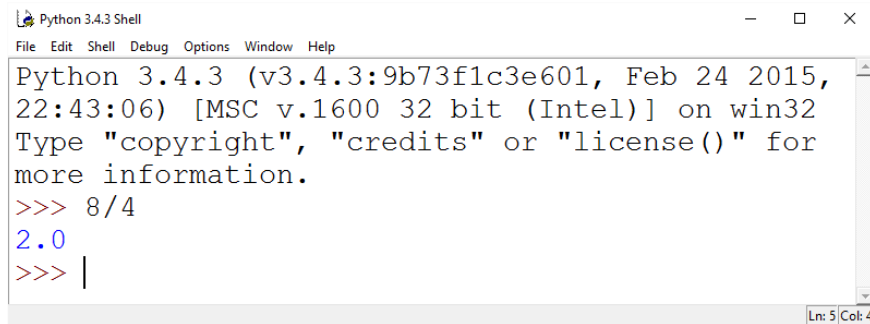In the Python equation:

$>>>$ 8 / 4

2.0

$>>>$

The dividend, 8, and the divisor, 4, are the two operands that the binary operator:

$$/$$

takes.

Figure 2: In python, we use the / symbol as a division operator. This is common to most programming languages. In the above example, we have divided 8 by 4, and have got the quotient, 2.0.

Let us return to the equation:

$$8 \div 4 = 2$$

In the above equation,

$$4$$

is termed 'the divisor.' In Latin, the '-or' suffix denotes the agent, or doer of an action. It is the:

$$4$$

that is doing the dividing. 8 is being divided *by 4*.

In the equation:

$$8 \div 4 = 2$$

the:

$$=$$

, or "equals sign," is termed 'the sign of equality.' The *sign of equality* or *equality operator* tells us that 8 divided by 4 *is equal to* 2.

In the equation:

$$8 \div 4 = 2$$

, 2 is termed 'the quotient.' The quotient[2] is simply the result of division.

The result of 8 being divided 4 ways is 2, so, therefore, 2 is the quotient.

If we were doing 'Sums' in primary school, then:

$$2$$

, the quotient, would be our answer.

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[2] See the chapter, <u>TWO WAYS OF CONCEPTUALISING DIVISION</u>

Integer Division in Python

In this section, we shall program a simple Integer-Division Calculator in Python.

```
"""A Calculator of Integer Division."""
""""""
"""\u00F7 is the Unicode for the Division Symbol."""
""""""
print("x \u00F7 y = z")
print("")
print("Enter x, the dividend:")
print("")
dividend = input()
print("")
print("x =" + " " + str(dividend))
print("")
"""                        """
print("Enter y, the divisor:")
print("")
divisor = input()
print("")
print("y =" + " " + str(divisor))
print("")
print("The Divisor =" + " " + str(divisor))
print("")
"""                        """
print(str(dividend) + " " + "\u00F7" + " " + str(divisor) + " " + "=" + " " + str(int(int(dividend)/int(divisor))))
print("")
print("z, the quotient =" + " " + str(int(int(dividend)/int(divisor))))
```

Figure 3: In the above-depicted program, we have programmed a simple Integer-Division Calculator that requests the user to input a dividend and a Divisor. The Integer-Division Calculator then returns a quotient.

```
Python 3.5.0b2 Shell                                                    –    □    ×
File  Edit  Shell  Debug  Options  Window  Help
Python 3.5.0b2 (v3.5.0b2:7a088af5615b, May 31 2015, 06:08:44) [MSC v.1900 32 bit (I
ntel)] on win32
Type "copyright", "credits" or "license()" for more information.
>>> ============================ RESTART ================================
>>>
x ÷ y = z

Enter x, the dividend:

8

x = 8

The Dividend = 8

Enter y, the divisor:

4

y = 4

The Divisor = 4

8 ÷ 4 = 2

z, the quotient = 2
>>> |
                                                                           Ln: 26 Col: 4
```

Figure 4: What the Integer-Division Calculator, as depicted in **Figure 3**, outputs when we, the user, input the Dividend, 8, and the Divisor, 4. As we can see, the program outputs the quotient, 2.

Glossary:

divide

- *verb.*

   3.   [with *object*] [MATHEMATICS] find how many times (a number) contains another: *36 **divided by** 2 equals 18.*

   - ➢ [no *object*] (of a number) be susceptible of division without a remainder: *30 does not divide by 8.*
   - ➢ find how many times (a number) is contained in another: *divide 4 into 20.*

   <ORIGIN> Middle English (as a verb): from Latin ***divider*** 'force apart, remove'. the noun dates from the mid 17th century.[3]

   <ETYMOLOGY> From the Latin 3rd-conjugation verb, 'dīvidō dividere, dīvīsī, dīvīsum,' which means, 'to divide;' 'to separate.' From the Latin inseparable particle, 'dĭs,' or 'dis-' which means 'in two;' and the Latin 2nd-declension verb, 'videō vidēre, vīdī, vīsum,' which means 'to see.' The etymological sense of the preceding seems to be 'to arrange something such that it *appear in two*.'

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[3] Oxford University Press. *Oxford Dictionary of English* (Electronic Edition). Oxford. 2010. Loc 202778

dividend

- *noun.*
    1. a sum of money paid regularly (typically annually) by a company to its shareholders out of its profits (or reserves).
        - ➢ a payment divided among a number of people, e.g. winners in a football pool or members of a cooperative.
        - ➢ an individual's share of a dividend.
        - ➢ (**dividends**) a benefit from an action or policy: *buying a rail pass may still **pay dividends***.
    2. [MATHEMATICS] a number to be divided by another number.

    \<ORIGIN\> late 15th century (in the general sense 'portion, share'): from Anglo-Norman French ***dividend***, from Latin ***dividendum*** 'something to be divided', from the verb ***divider*** (see <u>DIVIDE</u>).[4]

    \<ETYMOLOGY\> From the Latin gerundive, 'dīvidendum est,' which means 'that which must be divided.' From the Latin 3rd-conjugation verb, 'dīvidō dividere, dīvīsī, dīvīsum,' which means, 'to divide;' 'to separate.' From the Latin inseparable particle, 'dĭs,' or 'dis-' which means 'in two;' and the Latin 2nd-declension verb, 'videō vidēre, vīdī, vīsum,' which means 'to see.' The etymological sense of the preceding seems to be 'to arrange something such that it *appear in two*.'

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[4] *ibid*. Loc 202820

division

- ***noun***. [*mass noun*]
    1. the action of separating something into parts or the process of being separated: *the **division** of the land **into** small fields | a gene that helps regulate cell division.*
        ➢ the distribution of something separated into parts: *the **division** of his estates **between** the two branches of his family.*
        ➢ [*count noun*] an instance of members of a legislative body separating into two groups to vote: *the new clause was areed without a division.*
        ➢ [LOGIC] the action of dividing a wider class into two or mor subclasses.
    3. the process of dividing one number by another.
        ➢ [MATHEMATICS] the process of dividing a matrix, vector, or other quantity by another under specificrules to obtain a quotient.

        <ORIGIN> late Middle English: fromOld French ***devisiun***, from Latin ***divisio***(n-), from the verb ***dividere*** (see <u>DIVIDE</u>).[5]

<ETYMOLOGY> From the Latin 3rd-declension Feminine noun, 'dīvīsiō, dīvīsiōnis,' which means 'a division,' 'a distribution.'

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[5] Oxford University Press. *Oxford Dictionary of English* (Electronic Edition). Oxford. 2010. Loc 202998

divisor

- *noun*. [MATHEMATICS] a number by which another number is to be divided.
  - ➢ a number that divides into another without a remainder.

  <ORIGIN> late Middle English: from French *diviseur* or Latin *divisor*, from *dividere* (see DIVIDE).[6]

  <ETYMOLOGY> From the Latin 3rd-declension masculine noun, 'dīvīsor, dīvīsōris,' which means 'one who distributes.'

equation

- *noun.*
  1. [MATHEMATICS] a statement that the values of two mathematical expressions are equal (indicated by the sign =)
  2. [*mass noun*] the process of equating one thing with another: *the equation of science with objectivity*.
     - ➢ (**the equation**) a situation in which several factors must be taken into account: *money also came into the equation*.
  3. [CHEMISTRY] a symbolic representation of the changes which occur in a chemical reaction, expressed in terms of the formulae of the molecules or other species involved.

  <PHRASES>

  - ☐ **equation of the first (or second etc.) order** [MATHEMATICS] an equation involving only the first derivative, second derivative, etc.

  <ORIGIN> late Middle English: from Latin *aequatio-(n-),* from *aequare* 'make equal' (see EQUATE).[7]

  <ETYMOLOGY> from the Latin 1st-and-2nd-declension adjective, 'æqua, æquus, æquum,' which means 'equal;' and the 3rd-declension nominal suffix, '-tiō, (-tiōnis),' which denotes a state of being. Therefore,

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[6] *ibid.* Loc
[7] *ibid.* Loc 234861

etymologically, an 'equation' is '*a state of being equal*.' Etymologically, therefore, an 'equation' is a mathematical statement that declares terms to *be equal*.

operator

4.   [MATHEMATICS] a symbol or function denoting an operation (e.g. ×, +).[8]

<ETYMOLOGY> From the 3rd-declension masculine Latin noun, 'ŏpĕrātor, ŏpĕrātōris,' which means 'operator,' 'worker.' The Latin 3rd-declension noun, 'opus, operis,' which means 'work,' 'labour.' From the Latin 1st-conjugation verb, 'operō, operāre, operāvī, operātor;' and the 3rd-declension nominal suffix, '-or,   (-ōris)' which denotes a performer of an action. Etymologically, as regards Mathematics, it is the operator that is said to *perform* the *work* of the operation.

operation

☐ *noun*.

- ▪ [*mass noun*] the action of functioning or the fact of being active or in effect: *restrictions on the operation of market forces | the company's first hotel is now **in operation.***
- 4. [MATHEMATICS] a process in which a number, quantity, expression, etc., is altered or manipulated according to set formal rules, such as those of addition, multiplication, and differentiation.
  <ORIGIN> late Middle English: via Old French from Latin ***operatio(n-)***, from the verb ***operari*** 'expend labour on' (see Operate)[9]

<ETYMOLOGY> From the Latin 3rd-declension feminine noun, 'ŏpĕrātĭo, ŏpĕrātĭōnis,' which means 'a working,' 'a work,' 'a labour,' 'operation.' From the Latin 1st-declension deponent verb 'operor, operāre, operātus sum,' which means 'to work,' 'to labour,' 'to expend labour on;' and the Latin 3rd-declension nominal suffix, '-iō, (-iōnis),' which denotes a state of being. Etymologically, therefore, as regards Mathematics, an 'operation' is a 'mathematical *work*;' 'mathematical *working*;' a 'mathematical *labour*.' The mathematical *work* that would be carried out depends on the *operator*. For instance, if the *operator* be a plus sign, then the *mathematical work* to be carried out would be *addition*. Addition is a *type* of *operation*.

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[8] *ibid*. Loc 493860.
[9] *ibid*. Loc 493797