

# 25 As A Decimal

## Decimal

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The decimal numeral system (also called the base-ten positional numeral system and denary or decanary) is the standard system for denoting integer and non-integer numbers. It is the extension to non-integer numbers (decimal fractions) of the Hindu–Arabic numeral system. The way of denoting numbers in the decimal system is often referred to as decimal notation.

A decimal numeral (also often just decimal or, less correctly, decimal number), refers generally to the notation of a number in the decimal numeral system. Decimals may sometimes be identified by a decimal separator (usually "." or "," as in 25.9703 or 3,1415).

Decimal may also refer specifically to the digits after the decimal separator, such as in "3.14 is the approximation of  $\pi$  to two decimals".

The numbers that may be represented exactly by a decimal of finite length are the decimal fractions. That is, fractions of the form  $a/10^n$ , where  $a$  is an integer, and  $n$  is a non-negative integer. Decimal fractions also result from the addition of an integer and a fractional part; the resulting sum sometimes is called a fractional number.

Decimals are commonly used to approximate real numbers. By increasing the number of digits after the decimal separator, one can make the approximation errors as small as one wants, when one has a method for computing the new digits. In the sciences, the number of decimal places given generally gives an indication of the precision to which a quantity is known; for example, if a mass is given as 1.32 milligrams, it usually means there is reasonable confidence that the true mass is somewhere between 1.315 milligrams and 1.325 milligrams, whereas if it is given as 1.320 milligrams, then it is likely between 1.3195 and 1.3205 milligrams. The same holds in pure mathematics; for example, if one computes the square root of 22 to two digits past the decimal point, the answer is 4.69, whereas computing it to three digits, the answer is 4.690. The extra 0 at the end is meaningful, in spite of the fact that 4.69 and 4.690 are the same real number.

In principle, the decimal expansion of any real number can be carried out as far as desired past the decimal point. If the expansion reaches a point where all remaining digits are zero, then the remainder can be omitted, and such an expansion is called a terminating decimal. A repeating decimal is an infinite decimal that, after some place, repeats indefinitely the same sequence of digits (e.g.,  $5.123144144144144\dots = 5.123144$ ). An infinite decimal represents a rational number, the quotient of two integers, if and only if it is a repeating decimal or has a finite number of non-zero digits.

## Decimal separator

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A decimal separator is a symbol that separates the integer part from the fractional part of a number written in decimal form. Different countries officially designate different symbols for use as the separator. The choice of symbol can also affect the choice of symbol for the thousands separator used in digit grouping.

Any such symbol can be called a decimal mark, decimal marker, or decimal sign. Symbol-specific names are also used; decimal point and decimal comma refer to a dot (either baseline or middle) and comma

respectively, when it is used as a decimal separator; these are the usual terms used in English, with the aforementioned generic terms reserved for abstract usage.

In many contexts, when a number is spoken, the function of the separator is assumed by the spoken name of the symbol: comma or point in most cases. In some specialized contexts, the word decimal is instead used for this purpose (such as in International Civil Aviation Organization-regulated air traffic control communications). In mathematics, the decimal separator is a type of radix point, a term that also applies to number systems with bases other than ten.

## Dewey Decimal Classification

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The Dewey Decimal Classification (DDC) (pronounced DOO-ee) colloquially known as the Dewey Decimal System, is a proprietary library classification system which allows new books to be added to a library in their appropriate location based on subject.

It was first published in the United States by Melvil Dewey in 1876. Originally described in a 44-page pamphlet, it has been expanded to multiple volumes and revised through 23 major editions, the latest printed in 2011. It is also available in an abridged version suitable for smaller libraries. OCLC, a non-profit cooperative that serves libraries, currently maintains the system and licenses online access to WebDewey, a continuously updated version for catalogers.

The decimal number classification introduced the concepts of relative location and relative index. Libraries previously had given books permanent shelf locations that were related to the order of acquisition rather than topic. The classification's notation makes use of three-digit numbers for main classes, with fractional decimals allowing expansion for further detail. Numbers are flexible to the degree that they can be expanded in linear fashion to cover special aspects of general subjects. A library assigns a classification number that unambiguously locates a particular volume in a position relative to other books in the library, on the basis of its subject. The number makes it possible to find any book and to return it to its proper place on the library shelves. The classification system is used in 200,000 libraries in at least 135 countries.

## Decimal time

*10 decimal hours, each decimal hour into 100 decimal minutes and each decimal minute into 100 decimal seconds (100,000 decimal seconds per day), as opposed*

Decimal time is the representation of the time of day using units which are decimally related. This term is often used specifically to refer to the French Republican calendar time system used in France from 1794 to 1800, during the French Revolution, which divided the day into 10 decimal hours, each decimal hour into 100 decimal minutes and each decimal minute into 100 decimal seconds (100,000 decimal seconds per day), as opposed to the more familiar standard time, which divides the day into 24 hours, each hour into 60 minutes and each minute into 60 seconds (86,400 SI seconds per day).

The main advantage of a decimal time system is that, since the base used to divide the time is the same as the one used to represent it, the representation of hours, minutes and seconds can be handled as a unified value. Therefore, it becomes simpler to interpret a timestamp and to perform conversions. For instance, 1h23m45s is 1 decimal hour, 23 decimal minutes, and 45 decimal seconds, or 1.2345 decimal hours, or 123.45 decimal minutes or 12345 decimal seconds; 3 hours is 300 minutes or 30,000 seconds.

This property also makes it straightforward to represent a timestamp as a fractional day, so that 2025-08-23.54321 can be interpreted as five decimal hours, 43 decimal minutes and 21 decimal seconds after the start of that day, or a fraction of 0.54321 (54.321%) through that day (which is shortly after traditional 13:00). It

also adjusts well to digital time representation using epochs, in that the internal time representation can be used directly both for computation and for user-facing display.

## Indian numbering system

*Indian system uses a period as the decimal separator and the comma for grouping, while others use a comma for decimal separator and a thin space or point*

The Indian numbering system is used in India, Pakistan, Nepal, Sri Lanka, and Bangladesh to express large numbers, which differs from the International System of Units. Commonly used quantities include lakh (one hundred thousand, 10<sup>5</sup>) and crore (ten million, 10<sup>7</sup>) – written as 1,00,000 and 1,00,00,000 respectively in some locales. For example: 150,000 rupees is "1.5 lakh rupees" which can be written as "1,50,000 rupees", and 30,000,000 (thirty million) rupees is referred to as "3 crore rupees" which can be written as "3,00,00,000 rupees".

There are names for numbers larger than crore, but they are less commonly used. These include arab (100 crore, 10<sup>9</sup>), kharab (100 arab, 10<sup>11</sup>), nil or sometimes transliterated as neel (100 kharab, 10<sup>13</sup>), padma (100 nil, 10<sup>15</sup>), shankh (100 padma, 10<sup>17</sup>), and mahashankh (100 shankh, 10<sup>19</sup>). In common parlance (though inconsistent), the lakh and crore terminology repeats for larger numbers. Thus lakh crore is 10<sup>12</sup>.

In the ancient Indian system, still in use in regional languages of India, there are words for (10<sup>62</sup>). These names respectively starting at 1000 are sahasra, ayuta, laksha, niyuta, koti, arbhudha, abhja, karva, nikarva, mahapadma, shanmkhu, jaladhi, amtya, madhya, paraardha. In the Indian system, now prevalent in the northern parts, the next powers of ten are one lakh, ten lakh, one crore, ten crore, one arab (or one hundred crore), and so on.

## Universal Decimal Classification

*The Universal Decimal Classification (UDC) is a bibliographic and library classification representing the systematic arrangement of all branches of human*

The Universal Decimal Classification (UDC) is a bibliographic and library classification representing the systematic arrangement of all branches of human knowledge organized as a coherent system in which knowledge fields are related and inter-linked. The UDC is an analytico-synthetic and faceted classification system featuring detailed vocabulary and syntax that enables powerful content indexing and information retrieval in large collections. Since 1991, the UDC has been owned and managed by the UDC Consortium, a non-profit international association of publishers with headquarters in The Hague, Netherlands.

Unlike other library classification schemes that started their life as national systems, the UDC was conceived and maintained as an international scheme. Its translation into other languages started at the beginning of the 20th century and has since been published in various printed editions in over 40 languages. UDC Summary, an abridged Web version of the scheme, is available in over 50 languages. The classification has been modified and extended over the years to cope with increasing output in all areas of human knowledge, and is still under continuous review to take account of new developments.

Albeit originally designed as an indexing and retrieval system, due to its logical structure and scalability, UDC has become one of the most widely used knowledge organization systems in libraries, where it is used for either shelf arrangement, content indexing or both. UDC codes can describe any type of document or object to any desired level of detail. These can include textual documents and other media such as films, video and sound recordings, illustrations, maps as well as realia such as museum objects.

## Binary-coded decimal

*electronic systems, binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each digit is represented by a fixed number of bits, usually*

In computing and electronic systems, binary-coded decimal (BCD) is a class of binary encodings of decimal numbers where each digit is represented by a fixed number of bits, usually four or eight. Sometimes, special bit patterns are used for a sign or other indications (e.g. error or overflow).

In byte-oriented systems (i.e. most modern computers), the term unpacked BCD usually implies a full byte for each digit (often including a sign), whereas packed BCD typically encodes two digits within a single byte by taking advantage of the fact that four bits are enough to represent the range 0 to 9. The precise four-bit encoding, however, may vary for technical reasons (e.g. Excess-3).

The ten states representing a BCD digit are sometimes called tetrades (the nibble typically needed to hold them is also known as a tetrad) while the unused, don't care-states are named pseudo-tetrad(e)s[de], pseudo-decimals, or pseudo-decimal digits.

BCD's main virtue, in comparison to binary positional systems, is its more accurate representation and rounding of decimal quantities, as well as its ease of conversion into conventional human-readable representations. Its principal drawbacks are a slight increase in the complexity of the circuits needed to implement basic arithmetic as well as slightly less dense storage.

BCD was used in many early decimal computers, and is implemented in the instruction set of machines such as the IBM System/360 series and its descendants, Digital Equipment Corporation's VAX, the Burroughs B1700, and the Motorola 68000-series processors.

BCD per se is not as widely used as in the past, and is unavailable or limited in newer instruction sets (e.g., ARM; x86 in long mode). However, decimal fixed-point and decimal floating-point formats are still important and continue to be used in financial, commercial, and industrial computing, where the subtle conversion and fractional rounding errors that are inherent in binary floating point formats cannot be tolerated.

Denomination (currency)

*As of 2014, most decimal currencies use a 1-2-5 series of coins, but some other set of denominations would require fewer denominations of coins or a smaller*

Denomination is a proper description of a currency amount, usually for coins or banknotes. Denominations may also be used with other means of payment such as gift cards. For example, five euros is the denomination of a five-euro note.

Repeating decimal

*A repeating decimal or recurring decimal is a decimal representation of a number whose digits are eventually periodic (that is, after some place, the*

A repeating decimal or recurring decimal is a decimal representation of a number whose digits are eventually periodic (that is, after some place, the same sequence of digits is repeated forever); if this sequence consists only of zeros (that is if there is only a finite number of nonzero digits), the decimal is said to be terminating, and is not considered as repeating.

It can be shown that a number is rational if and only if its decimal representation is repeating or terminating. For example, the decimal representation of  $\frac{1}{3}$  becomes periodic just after the decimal point, repeating the single digit "3" forever, i.e. 0.333.... A more complicated example is  $\frac{3227}{555}$ , whose decimal becomes periodic at the second digit following the decimal point and then repeats the sequence "144" forever, i.e.

5.8144144144.... Another example of this is  $\frac{593}{53}$ , which becomes periodic after the decimal point, repeating the 13-digit pattern "1886792452830" forever, i.e. 11.18867924528301886792452830....

The infinitely repeated digit sequence is called the repetend or reptend. If the repetend is a zero, this decimal representation is called a terminating decimal rather than a repeating decimal, since the zeros can be omitted and the decimal terminates before these zeros. Every terminating decimal representation can be written as a decimal fraction, a fraction whose denominator is a power of 10 (e.g.  $1.585 = \frac{1585}{1000}$ ); it may also be written as a ratio of the form  $\frac{k}{2^n \cdot 5^m}$  (e.g.  $1.585 = \frac{317}{2^3 \cdot 5^2}$ ). However, every number with a terminating decimal representation also trivially has a second, alternative representation as a repeating decimal whose repetend is the digit "9". This is obtained by decreasing the final (rightmost) non-zero digit by one and appending a repetend of 9. Two examples of this are  $1.000... = 0.999...$  and  $1.585000... = 1.584999...$  (This type of repeating decimal can be obtained by long division if one uses a modified form of the usual division algorithm.)

Any number that cannot be expressed as a ratio of two integers is said to be irrational. Their decimal representation neither terminates nor infinitely repeats, but extends forever without repetition (see § Every rational number is either a terminating or repeating decimal). Examples of such irrational numbers are  $\pi$  and  $e$ .

### Orders of magnitude (time)

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An order of magnitude of time is usually a decimal prefix or decimal order-of-magnitude quantity together with a base unit of time, like a microsecond or a million years. In some cases, the order of magnitude may be implied (usually 1), like a "second" or "year". In other cases, the quantity name implies the base unit, like "century". In most cases, the base unit is seconds or years.

Prefixes are not usually used with a base unit of years. Therefore, it is said "a million years" instead of "a megayear". Clock time and calendar time have duodecimal or sexagesimal orders of magnitude rather than decimal, e.g., a year is 12 months, and a minute is 60 seconds.

The smallest meaningful increment of time is the Planck time—the time light takes to traverse the Planck distance, many decimal orders of magnitude smaller than a second.

The largest realized amount of time, based on known scientific data, is the age of the universe, about 13.8 billion years—the time since the Big Bang as measured in the cosmic microwave background rest frame. Those amounts of time together span 60 decimal orders of magnitude. Metric prefixes are defined spanning  $10^{-30}$  to  $10^{30}$ , 60 decimal orders of magnitude which may be used in conjunction with the metric base unit of second.

Metric units of time larger than the second are most commonly seen only in a few scientific contexts such as observational astronomy and materials science, although this depends on the author. For everyday use and most other scientific contexts, the common units of minutes, hours (3 600 s or 3.6 ks), days (86 400 s), weeks, months, and years (of which there are a number of variations) are commonly used. Weeks, months, and years are significantly variable units whose lengths depend on the choice of calendar and are often not regular even with a calendar, e.g., leap years versus regular years in the Gregorian calendar. This makes them problematic for use against a linear and regular time scale such as that defined by the SI, since it is not clear which version is being used.

Because of this, the table below does not include weeks, months, and years. Instead, the table uses the annum or astronomical Julian year (365.25 days of 86 400 seconds), denoted with the symbol *a*. Its definition is based on the average length of a year according to the Julian calendar, which has one leap year every four

years. According to the geological science convention, this is used to form larger units of time by the application of SI prefixes to it; at least up to giga-annum or Ga, equal to 1 000 000 000 a (short scale: one billion years, long scale: one milliard years).

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