H

H

prefix h, meaning 100 times. H with diacritics: ? IPA-specific symbols related to H: ? ? ? ? ? ? ? Superscript

?H?, or ?h?, is the eighth letter of the Latin alphabet, used in the modern English alphabet, including the alphabets of other western European languages and others worldwide. Its name in English is aitch (pronounced , plural aitches), or regionally haitch (pronounced , plural haitches).

Planck constant

The Planck constant, or Planck's constant, denoted by h {\displaystyle h} , is a fundamental physical constant of foundational importance in quantum mechanics:

The Planck constant, or Planck's constant, denoted by

h

{\displaystyle h}

, is a fundamental physical constant of foundational importance in quantum mechanics: a photon's energy is equal to its frequency multiplied by the Planck constant, and a particle's momentum is equal to the wavenumber of the associated matter wave (the reciprocal of its wavelength) multiplied by the Planck constant.

The constant was postulated by Max Planck in 1900 as a proportionality constant needed to explain experimental black-body radiation. Planck later referred to the constant as the "quantum of action". In 1905, Albert Einstein associated the "quantum" or minimal element of the energy to the electromagnetic wave itself. Max Planck received the 1918 Nobel Prize in Physics "in recognition of the services he rendered to the advancement of Physics by his discovery of energy quanta".

In metrology, the Planck constant is used, together with other constants, to define the kilogram, the SI unit of mass. The SI units are defined such that it has the exact value

h

{\displaystyle h}

= 6.62607015×10?34 J?Hz?1? when the Planck constant is expressed in SI units.

The closely related reduced Planck constant, denoted

?

{\textstyle \hbar }

(h-bar), equal to the Planck constant divided by 2?:

?

=

h

2

?

{\textstyle \hbar ={\frac {h}{2\pi }}}

, is commonly used in quantum physics equations. It relates the energy of a photon to its angular frequency, and the linear momentum of a particle to the angular wavenumber of its associated matter wave. As

h

{\displaystyle h}

has an exact defined value, the value of

?

{\textstyle \hbar }

can be calculated to arbitrary precision:

?

{\displaystyle \hbar }

= 1.054571817...×10?34 J?s. As a proportionality constant in relationships involving angular quantities, the unit of

?

{\textstyle \hbar }

may be given as J·s/rad, with the same numerical value, as the radian is the natural dimensionless unit of angle.

Aspirated consonant

by the aspiration modifier letter ????, a superscript form of the symbol for the voiceless glottal fricative ?h?. For instance, ?p? represents the voiceless

In phonetics, aspiration is a strong burst of breath that accompanies either the release or, in the case of preaspiration, the closure of some obstruents. In English, aspirated consonants are allophones in complementary distribution with their unaspirated counterparts, but in some other languages, notably most South Asian languages and East Asian languages, the difference is contrastive.

Quaternion

conventionally denoted by H {\displaystyle \ \mathbb {H} \ } ('H' for Hamilton), or if blackboard bold is not available, by H. Quaternions are not quite

In mathematics, the quaternion number system extends the complex numbers. Quaternions were first described by the Irish mathematician William Rowan Hamilton in 1843 and applied to mechanics in three-dimensional space. The set of all quaternions is conventionally denoted by

H

{\displaystyle \ \mathbb {H} \ }

('H' for Hamilton), or if blackboard bold is not available, by

H. Quaternions are not quite a field, because in general, multiplication of quaternions is not commutative. Quaternions provide a definition of the quotient of two vectors in a three-dimensional space. Quaternions are generally represented in the form

a

+

b

i

+

c

j

+

d

k

,

{\displaystyle a+b\,\mathbf {i} +c\,\mathbf {j} +d\,\mathbf {k} ,}

where the coefficients a, b, c, d are real numbers, and 1, i, j, k are the basis vectors or basis elements.

Quaternions are used in pure mathematics, but also have practical uses in applied mathematics, particularly for calculations involving three-dimensional rotations, such as in three-dimensional computer graphics, computer vision, robotics, magnetic resonance imaging and crystallographic texture analysis. They can be used alongside other methods of rotation, such as Euler angles and rotation matrices, or as an alternative to them, depending on the application.

In modern terms, quaternions form a four-dimensional associative normed division algebra over the real numbers, and therefore a ring, also a division ring and a domain. It is a special case of a Clifford algebra, classified as

Cl

0

,

2

?

(

R

)

?

Cl

3

,

0

+

?

(

R

)

.

{\displaystyle \operatorname {Cl} _{0,2}(\mathbb {R})\cong \operatorname {Cl} _{3,0}^{+}(\mathbb {R}).}

It was the first noncommutative division algebra to be discovered.

According to the Frobenius theorem, the algebra

H

{\displaystyle \mathbb {H} }

is one of only two finite-dimensional division rings containing a proper subring isomorphic to the real numbers; the other being the complex numbers. These rings are also Euclidean Hurwitz algebras, of which the quaternions are the largest associative algebra (and hence the largest ring). Further extending the quaternions yields the non-associative octonions, which is the last normed division algebra over the real numbers. The next extension gives the sedenions, which have zero divisors and so cannot be a normed division algebra.

The unit quaternions give a group structure on the 3-sphere S3 isomorphic to the groups Spin(3) and SU(2), i.e. the universal cover group of SO(3). The positive and negative basis vectors form the eight-element quaternion group.

Fraktur

German-language texts. ?

Fraktur (German: [f?ak?tu???]) is a calligraphic hand of the Latin alphabet and any of several blackletter typefaces derived from this hand. It is designed such that the beginnings and ends of the individual strokes that make up each letter will be clearly visible, and often emphasized; in this way it is often contrasted with the curves of the Antiqua (common) typefaces where the letters are designed to flow and strokes connect together in a continuous fashion. The word "Fraktur" derives from Latin fr?ct?ra ("a break"), built from fr?ctus, passive participle of frangere ("to break"), which is also the root for the English word "fracture". In non-professional contexts, the term "Fraktur" is sometimes misused to refer to all blackletter typefaces – while Fraktur typefaces do fall under that category, not all blackletter typefaces exhibit the Fraktur characteristics described above.

Fraktur is often characterized as "the German typeface", as it remained popular in Germany and much of Eastern Europe far longer than elsewhere. Beginning in the 19th century, the use of Fraktur versus Antiqua (seen as modern) was the subject of controversy in Germany. The Antiqua–Fraktur dispute continued until 1941, when the Nazi government banned Fraktur typefaces. After Nazi Germany fell in 1945, Fraktur was unbanned, but it failed to regain widespread popularity.

Unicode subscripts and superscripts

that chemical and algebraic formulas could be written without markup. Thus "H?O" (using a subscript 2 character) is supposed to be identical to "H2O" (with

Unicode has subscripted and superscripted versions of a number of characters including a full set of Arabic numerals. These characters allow any polynomial, chemical and certain other equations to be represented in plain text without using any form of markup like HTML or TeX.

The World Wide Web Consortium and the Unicode Consortium have made recommendations on the choice between using markup and using superscript and subscript characters:

When used in mathematical context (MathML) it is recommended to consistently use style markup for superscripts and subscripts [...] However, when super and sub-scripts are to reflect semantic distinctions, it is easier to work with these meanings encoded in text rather than markup, for example, in phonetic or phonemic transcription.

Hamiltonian mechanics

equations. Indeed, d H d t = ? H ? p ? p ? + ? H ? q ? q ? + ? H ? t , {\textstyle {\frac {d{\mathcal {H}}}{dt}}={\frac {\partial {\mathcal {H}}}{\partial {\boldsymbol

In physics, Hamiltonian mechanics is a reformulation of Lagrangian mechanics that emerged in 1833. Introduced by the Irish mathematician Sir William Rowan Hamilton, Hamiltonian mechanics replaces (generalized) velocities

q

?

i

{\displaystyle {\dot {q}}^{i}}

used in Lagrangian mechanics with (generalized) momenta. Both theories provide interpretations of classical mechanics and describe the same physical phenomena.

Hamiltonian mechanics has a close relationship with geometry (notably, symplectic geometry and Poisson structures) and serves as a link between classical and quantum mechanics.

Enclosed Alphanumerics

? ? ? ? U+24Bx ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? U+24Cx ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? U+24Dx ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? U+24Ex ? ? ? ? ? ? ? ? ?

Enclosed Alphanumerics is a Unicode block of typographical symbols of an alphanumeric within a circle, a bracket or other not-closed enclosure, or ending in a full stop.

It is currently fully allocated. Within the Basic Multilingual Plane, a few additional enclosed numerals are in the Dingbats and the Enclosed CJK Letters and Months blocks. There is also a block with more of these characters in the Supplementary Multilingual Plane named Enclosed Alphanumeric Supplement (U+1F100–U+1F1FF), as of Unicode 6.0.

Enclosed Alphanumeric Supplement

? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? U+1F13x ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? U+1F14x ? ? ? ? ? ? ? ? ? ? ? ? ? ?

Enclosed Alphanumeric Supplement is a Unicode block consisting of Latin alphabet characters and Arabic numerals enclosed in circles, ovals or boxes, used for a variety of purposes. It is encoded in the range U+1F100–U+1F1FF in the Supplementary Multilingual Plane.

The block is mostly an extension of the Enclosed Alphanumerics block, containing further enclosed alphanumeric characters which are not included in that block or Enclosed CJK Letters and Months. Most of the characters are single alphanumerics in boxes or circles, or with trailing commas. Two of the symbols are identified as dingbats. A number of multiple-letter enclosed abbreviations are also included, mostly to provide compatibility with Broadcast Markup Language standards (see ARIB STD B24 character set) and Japanese telecommunications networks' emoji sets. The block also includes the regional indicator symbols to be used for emoji country flag support.

H. H. Kung

K'ung3 Hsiang2-hsi1; 11 September 1880 – 16 August 1967), often known as Dr. H. H. Kung, also known as Dr. Chauncey Kung, was a Chinese banker and politician

Kung Hsiang-hsi (Chinese: ???; pinyin: K?ng Xiángx?; Wade–Giles: K'ung3 Hsiang2-hsi1; 11 September 1880 – 16 August 1967), often known as Dr. H. H. Kung, also known as Dr. Chauncey Kung, was a Chinese banker and politician. He married Soong Ai-ling, the eldest of the three Soong sisters; the other two married President Sun Yat-sen and President Chiang Kai-shek. Together with his brother-in-law, Soong Tse-ven, he was highly influential in determining the economic policies of the Kuomintang-led Nationalist government of the Republic of China in the 1930s and 1940s.

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