WEBSTER'S THIRD BOOK OF RECORDS

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The Guinness Book of Records has catalogued the world's extremes for nearly 50 years. First appearing in Britain in 1955 and the US in 1956, this book has listed the highest, the lowest, the hottest, the coldest, the largest, the smallest and so on, from a wide range of natural phenomena and human endeavors.

Throughout the history of Word Ways, probably the most frequently quoted dictionary has been Webster's Third New International Dictionary. I wondered what sort of extremes, a la Guinness, could be found in the definitions of Webster's Third. For example, what are the largest and smallest numbers occurring in Webster's definitions? What other extremes exist in the Websterian definitions for distance, area, volume, speed, mass, temperature, time and so on? Attempting to identify the Websterian records has been an interesting journey. Some records I have managed to go straight to in the dictionary; others have required more research.

In researching this article, I used the CD-ROM version of Webster's Third, version 2.5 dated 2000. The CD-ROM contains many words, terms and updated entries that are not necessarily in the printed versions of the dictionary. For example, the very precise definition of *string* used in this article does not appear in my 1961 printing, nor do the terms *gigabyte* or even *byte*!

It may be that several of my finds can be updated by readers—if you manage to find an improvement in Webster's Third, please submit it to the editor.

Numbers

What are the number extremes in Webster's Third—the smallest, the largest, the most precise? To begin with, what's the smallest number occurring in a Webster's Third definition? The number 0.00000001 appears in the definition for *smell*:

> The one of the special senses that is concerned with the perception of the quality of a substance which is classified as odor, is mediated by the olfactory organ, is normally sensitive to volatile or dissolved material in extremely low concentration (as 0.00000001 mg. per liter), is conducted centrally by the olfactory nerve, and is coordinated especially by centers in the hippocampal convolution

However, much smaller numbers occur in Webster's Third, and are represented as negative powers of ten. The smallest power of ten occurring in a Webster's Third definition is probably 10 exp –33, which appears in the following definition of *string*:

> A hypothetical one-dimensional object that is infinitely thin but has a length of 10 exp –33 centimeters, that vibrates as it moves through space, and whose mode of vibration manifests itself as a subatomic particle.

At the other extreme, what's the largest number occurring in a Webster's Third definition? The largest number not expressed using a power of ten is probably in the definition of *light-year*:

> A unit of length in interstellar astronomy equal to the distance that light travels in one year in a vacuum or 5,878,000,000,000 miles

Put another two ways, that's about 5.9 trillion miles and 5.9 x 10 exp 12 miles. It's not obvious why the editors of Webster's Third felt it necessary to write this large number out longhand, rather than using either of the two shorter forms. What about the largest number involving a power of ten? I homed in on 10 exp 39, which appears in this definition of *gravity*:

> A fundamental physical force that is responsible for interactions between particles, between aggregations of matter (as stars and planets), and between aggregations of matter and particles (as photons) which occur because of mass, that is 10 exp 39 times weaker than the strong force and is the weakest fundamental physical force, and that extends over infinite distances but because of its weakness is evident only over large distances especially between aggregations of matter

Then I realized that the well-documented *googol* was equal to 10 exp 100, much larger than the previous 10 exp 39 figure. The dictionary definition for the main entry at *googol* simply states

> The figure 1 followed by 100 zeroes equal to 10 exp 100

But way beyond this in size is the much larger *googolplex*, whose definition reads

> The figure 1 followed by a googol of zeroes equal to 10 exp googol

The editor suggested I search for the largest number involving the *–illion* ending (as in *million, billion,* etc.). The largest such number given as a main entry in the dictionary is *centillion*, where the entry merely says "see number table". Turning to the number table, the Webster editors have given this two different values: 10 exp 303 in the US system and 10 exp 600 in the British system. Since the latter is a much larger number, we prefer this definition of centillion. Indeed, it's worth noting that a googol raised to the power of 6 is equal to a British centillion. So while the centillion is larger than a googol, it is still tiny in comparison with a googolplex.

The largest number ending in *–illion* which appears in a definition (as opposed to being a main entry) is the lowly *quintillion*. One of the definitions of the adjectival quintillion simply says "being a quintillion in number".

The preceding paragraphs document some very large numbers and very small numbers. A related extreme concerns the precision of numbers. What are the most precise numbers? One of the definitions of *pound* contains a number expressed to an accuracy of ten decimal places:

> Any of various units of mass and weight: a unit equal to 12 troy ounces or 5760 grains or 0.3732417216 kilogram formerly used in weighing gold, silver, and a few other costly materials—called also troy pound

The only other number expressed with an accuracy approaching this is the ten-digit example occurring in the definition of *gigabyte*: 1,073,741,824 bytes.

Large number, small numbers! What about repetitious numbers? What is the longest string of repeating digits, uninterrupted by any other characters, appearing in dictionary definitions? A string of three 1's occurs in the date in he definition at *Premonstratensian*:

> A member of an order of regular canons founded by St. Norbert at Premontre near Laon, France, in 1119

A string of three 2's appears in the lengthy definition at *uranium series,* of which the following is just a part:

> A radioactive series beginning with uranium I of mass number 238 and ending with radium G constituting the nonradioactive isotope of lead of mass number 206: … at no. 88 → radon 222

A string of three 3's appears in the number 2333 occurring in this definition at *sigma*:

> An unstable subatomic particle of the baryon family existing in positive, negative, and neutral charge states with masses respectively 2328, 2343, and 2333 times the mass of an electron

A string of three 4's occurs in the BC date 444 in this definition of *cynic*:

> A member or follower of a school of philosophers founded by Antisthenes (b ab 444 B.C.) that taught that virtue is the only good, its essence lying in self-control and independence, and that later developed into a coarse opposition to social customs and current philosophical opinions—contrasted with Cyrenaic

A string of three 5's appears in the date 1555 in this definition of *Waterlander*:

> One of a liberal body of Dutch Mennonites separated from the conservative Mennonites after 1555 and later reunited with the liberalized older body

I was surprised to find no occurrences of 666 anywhere in the dictionary. It's odd that the dictionary can define the term *mark of the beast* without referring to the number 666. There doesn't appear to be a string of three 7's anywhere in the dictionary, either. A string of three 8's occurs in this definition at *ligne*:

> Any of various units of measure: A French unit for watch movements equal to 0.0888 inch

A string of three 9's appears in this definition of *numbers,* entered within the extensive definitions of *number*:

> Numbers plural but singular or plural in construction: a form of lottery played in the United States in which one may select any three digits from 001 to 999 and bet on them to appear in a specified order or in any combination and in which he winning numbers and order are determined by figures regularly published in newspapers (as clearinghouse or stock market receipts, pari-mutuel payoffs, or the cards in an article on contract bridge)—called also number pool, numbers game

But, returning to a definition appearing earlier in this article, there is an unbroken string of seven 0's in the definition of *smell.*

All the numbers considered so far in this article have used the Arabic numerals 0-9. Are there interesting entries in the dictionary making use of the Roman numerals? The largest number expressed in Roman numerals which occurs in any definition is probably LXX in this definition of *Septuagint*:

> The 70 or 72 Jewish scholars at Alexandria held to have translated the Old Testament into Greek: a copy or edition of the Greek translation of the Old Testament including the Apocrypha prepared in the 3d and 2d centuries B.C., constituting the first vernacular translation of the Bible, designed

> to meet the needs of Greek-speaking Jews of Egypt unable to read their Scriptures in Hebrew, and still used in the Eastern Orthodox Church—symbol LXX

There seems to be no use of Roman numerals for dates in the dictionary. So, Roman numerals such as MCMLVIII just do not appear! Apart from LXX with its rather specific meaning, the next largest Roman number may be XXVI which appears in this definition of *saite*: of or relating to the XXVIth Dynasty of ancient Egypt.

The greatest concentration of Roman numerals is in the table at the entry *number*. This table includes MM as the Roman number for 2000. It also includes M with a bar above it, meaning one million.

Distances, Areas, Volumes

Still sticking with numbers, what are the largest and smallest distances that are referenced in the dictionary? And what extremes of area and volume are mentioned? The smallest distances occurring in dictionary definitions are probably those expressed in angstroms. The definition of *angstrom* sets the scene:

> Either of two units of wavelength: a: one ten-billionth of a meter—called also absolute angstrom b: the wavelength of the red spectrum line of cadmium divided by 6438.4696—called also international angstrom

But even smaller than one angstrom is the 0.024 angstrom measurement mentioned at *annihilation radiation*:

> Radiation produced by the mutually annihilating coalescence of an electron and a positron from which two radiation quanta travel in opposite directions with a wavelength corresponding to that of very short gamma rays, being approximately 0.024 angstrom

But the smallest distance mentioned anywhere in the dictionary appears to be the concise definition given at *milliangstrom*: one thousandth of an angstrom. I checked for smaller divisions of an angstrom (micro-, nano-, etc.), but these don't appear in the dictionary.

What about the largest distance mentioned in the dictionary? The definition of *light-year* has already been quoted above. A larger unit of distance used in astronomy is the *parsec*, equivalent to about three and one-quarter light-years. Here's what the definition of parsec says:

> A unit of measure for interstellar space equal to a distance having a heliocentric parallax of one second or to 206,265 times the radius of the earth's orbit or to 3.26 light-years or to 19.2 trillion miles

We can now take a giant leap from 3.26 light-years to 200 thousand light-years, courtesy of this definition of *Magellanic Cloud*:

> Either of the two nearest galaxies to the Milky Way system located within 25 degrees of the south celestial pole and appearing as conspicuous patches of light resembling detached portions of the Milky Way but actually more than 200,000 light-years distant

But bigger still by a factor of about 16 is the *megaparsec*, defined succinctly as follows: one million parsecs. Let's do a reality check on this distance. It's one million parsecs, or 3.26 million

light-years, or 19.2 million trillion miles, or 19.2 quintillion miles, or 1.92 x 10 exp 19 miles, or 19,200,000,000,000,000,000 miles. Far out!

Are there any dictionary entries involving greater distances still? Perhaps. The definition at *cosmic string* refers to "millions of light-years". If that's more than 3.26 million light-years—as seems likely—then we have an even larger distance. If that's less than 3.26 million light-years, then we'll stick with megaparsec as the record-holder. Our money's on cosmic string.

> Any of a class of hypothetical supermassive astronomical objects that are extremely thin but are millions of light years long, that are postulated to have formed very early in the history of the universe and to be the cause of the lack of uniformity in mass distribution of the universe, and that have been proposed to act in certain instances as gravitational lenses

How about areas? What is the smallest area mentioned in the dictionary? We were quite taken with this very precise areal measurement given at *circular mil*, where there is no reference to a negative power of ten:

> A unit of area used especially for the cross section of wire equal to the area of a circle having a diameter of one mil and equivalent to 0.000000785 square inch

However, that area is positively gargantuan in comparison to our next contender. The world of nuclear physics has felt the need for a unit called a *barn*, defined thus:

> A unit of area that equals 10 exp –24 sq. cm. used in nuclear physics for measuring cross section

It turns out that even a barn is rather large for expressing the area over which certain nuclear reactions occur, and physicists have felt it necessary to define an even smaller area, the *millibarn*:

> A unit of nuclear cross section equal to 1/1000 barn

No sign, though, of smaller areas, perhaps barn prefixed by micro- or nano- or pico-.

At the other end of the spectrum, what's the largest area referred to in any definition in the dictionary? We think it's probably the 55 million square miles mentioned in this lengthy definition of *red clay*:

> A slowly accumulating abysmal deposit covering some 55,000,000 square miles of the deepest part of the ocean bottom and consisting of the insoluble residual material of volcanic and meteoritic or cosmic dust mingled with nodules of manganese oxide, crystals of the zeolite phillipsite, sharks' teeth, the siliceous tests of Radiolaria, and other resistant organic debris

In the scheme of things, this isn't such a huge area. For example, the approximate area of the Pacific Ocean is 70 million square miles but—as Webster's Third isn't an encyclopedic dictionary—this fact isn't recorded anywhere in the dictionary

Enough of distances and areas—what of volumes? We think the smallest volume mentioned anywhere in the dictionary is the cubic millimeter, which occurs in this definition for *cell count*:

> A count of cells especially of a body fluid (as blood) in a standard volume (as a cubic millimeter)

Compared with some of the microscopic distances and areas mentioned previously, a volume of a cubic millimeter seems quite large—it's a volume that could still be visible to the naked eye!

Astronomy comes to our rescue when seeking the largest volume in the dictionary. It seems likely that the cubic parsec, mentioned in this definition of *star density*, is the largest volume in the dictionary:

> The number of stars in a unit volume of space often expressed as per cubic parsec

We've already seen that 1 parsec = 19.2 trillion miles, so the volume of a cubic parsec is approximately 8 x 10 exp 39 cubic miles.

Speed, Mass, Temperature

As the slowest speed of any body or occurrence is obviously zero, when it is stationary, we haven't attempted to identify any specific occurrences of this in the dictionary. As for the fastest speed in the dictionary, we have gone straight to the entry at *velocity of light*:

> A fundamental constant that represents the speed of electromagnetic radiation in a vacuum and equals approximately 2.9979 x 10 exp 10 centimeters per second

How about mass? What is the smallest mass mentioned in the dictionary? And the largest? The smallest mass is probably the rest mass of an *electron,* referred to in the following definition:

> One of the constituent elementary particles of an atom being a charge of negative electricity equal to about 1.602 x 10 exp –19 coulomb, having a mass when at rest of about 9.109 x 10 exp –28 gram of 1/1837 that of a proton, being the least massive known charged particle, and having a magnetic moment of about 1 Bohr magneton associated with its one half quantum unit of spin

Seeking the largest mass in the dictionary, we begin with the fairly obvious *megaton*, defined as:

> An explosive force equivalent to that of a million tons of TNT

From there we progressed to *solar mass*:

> The mass of the sun amounting to 2 x 10 exp 33 grams and being used as a unit for the expression of the masses of other stars, nebulas and galaxies

The first mass here is given in tons, so to provide a more direct comparison with the second figure, let's convert a megaton to grams. A million tons is roughly equal to 10 exp 12 grams, so is only a tiny fraction of the 2 x 10 exp 33 grams in a solar mass. A slightly larger mass is the 1.4 solar masses mentioned in the definition at *Chandrasekhar limit*:

> The maximum mass at which a star near the end of its life cycle can become a white dwarf and above which the star will collapse to form a neutron star or black hole : a stellar mass equal to about 1.4 solar masses

We believe this is the largest mass mentioned anywhere in the dictionary.

Just as we went straight to velocity of light to give us our highest speed, so we go straight to *absolute zero* for our lowest temperature, thus:

> A hypothetical temperature characterized by complete absence of heat on the Kelvin scale: approximately –273.15°C or –459.67°F at which no heat for performance of work could be derived

The search for the highest temperature in the dictionary isn't so straightforward. The highest specific temperature mentioned is the 6000°C in this definition of *white light*:

> Light that has the same spectral energy distribution as unobstructed noon sunlight and is approximately the same as that of a blackbody radiator at 6000°C

A higher nonspecific temperature is referred to in the definition of *corona*, thus:

> The tenuous outermost part of the atmosphere of the sun extending for millions of miles from its surface, containing very highly ionized atoms of iron, nickel, and other gases that indicate a temperature of millions of degrees, and appearing to the naked eye as a pearly gray halo around the moon's black disk during a total eclipse of the sun but observable at other times with a coronagraph

The rather vague "millions of degrees" (how many millions? Fahrenheit? Centigrade?) is substantially higher than the 6000°C mentioned at white light. Higher temperatures, probably tens of millions of degrees, occur deep within stars, but this fact appears to be absent from Webster's Third.

Time

The shortest period of time mentioned in the dictionary seems to be the *picosecond*, defined thus: one trillionth of a second. We had hoped to find *femtosecond* in Webster's Third, but it's not there. (However, it is given as a main entry in our 1998 printing of Webster's New Collegiate Dictionary, 10th edition, where it is defined as one quadrillionth of a second.)

And what of the longest time period in the dictionary? The main entry *cosmic year* weighs in with a 200 million year span:

> The estimated time required for a star at the sun's distance from the center of the Milky Way galaxy to make one trip around it in a circular orbit, about 200 million years

But this is beaten by the brief entry at *aeon*: a unit of geologic time equal to one billion years.

Sticking with time, what is the earliest specific date mentioned in the dictionary? Is there nothing earlier than the 5000 BC occurring in this definition of *Badarian*?

> Of or belonging to an Egyptian predynastic Neolithic culture dated about 5000 BC and characterized by fine handmade pottery (as black beakers with incised designs in white), flint tools, and polished stone axes

We should note, though, that the table at *geologic time* mentions many epochs, eras and eons, stating approximately how many millions of years ago that they occurred. The oldest is the *Archean* which began 4000 million years before the present day.

What about the dates closest to the BC-AD divide? The latest BC date seems to be 4 BC, occurring in this definition of *Herodian*:

> Of or relating especially to Herod the Great, king of Judea (37-4 BC)

And the earliest AD date in a definition may be AD 100 at *Arretine ware*:

> Red terracotta ware usually decorated in relief made at Arretium and elsewhere in Italy from about 100 BC to about AD 100—called also Samian ware, terra sigillata

A slightly earlier AD date, AD 96, crops up in the etymology at *Domitian*:

> Etymology: After Domitian (Domitianus Augustus) d AD 96 Roman emperor

We wouldn't be surprised if an earlier AD date exists somewhere in the dictionary, but we have been unable to find it.

The latest date appearing in any definition in the dictionary is 1991, just over a decade ago, in this definition of *austral*: the basic monetary unit of Argentina 1985-91. For how long this remains the latest date in the dictionary depends on when and how frequently Merriam-Webster chooses to update the CD-ROM version of the dictionary.

Chemical Formulae

We are interested in the extremes of chemical formulae, but there are several ways that these may be characterized. Do we go for the longest formula, the one with the most characters? Do we go for the formula containing the highest number? Do we go for the formula with the most different elements? The longest may be *tourmaline:* $(Na,Ca)(Li,Mg,Fe,Al)(Al,Fe)_6B_3Si_6O_{27}(O,OH,F)_4$. The record high number (for Webster) is 186, found in *jecorin*: $C_{105}H_{186}N_5O_{46}P_3S$. This definitely beats *cyclosporine,* which only contains the subscript 111. The formula for *dashkensanite* involves nine different elements: $(Na,K)Ca_2(Fe,Mg)_5(Si,Al)_8O_{22}Cl_2$. However, this is exceeded by the eleven different elements already exhibited in tourmaline.

Long Entries

Well-known for its extreme length, 45 letters, is *pneumonoultramicroscopicsilicovolcanoconiosis* This is the longest solidly-spelled word in the dictionary. But if embedded hyphens and spaces can be counted as characters, then *Two-Seed-in-the-Spirit Predestinarian Baptist* is a 45-character entry. Longer still are the 46- and 47- character entries *master chief petty officer of the Coast Guard* and *certificate of public convenience and necessity.* Presumably, the plural forms of these (officers and certificates) increase the lengths to 47 and 48 characters.

Webster's Third contains many biological names and terms. We believe that the longest two-word biological name appearing anywhere in the dictionary is *Desulfovibrio halohydrocarbonoclasticus*, occurring in the definition of *Desulfovibrio*:

> A genus of curved mobile anaerobic bacteria rods (family Spirillaceae) that reduce sulfates to hydrogen sulfide and include at least one form (Desulfovibrio halohydrocarbonoclasticus) capable of increasing the flow of oil wells by raising the gas pressure and enlarging the flow channels in the rock

There are probably many more extremes that we could have searched for in Webster's Third, but we felt we had to draw the line somewhere. If readers can improve on any of the extremes we've offered here, we'd be delighted to learn of them. Also, are there any suggestions for additional areas of extremeness?