MATHEMATICS

BOOK 1

HAPPINESS

IS

MATHEMATICS

MATH TOPICS

NUMBERS

DISTRIBUTIONS - STATISTICS

S-CURVES

MODULATION - WAVES

BITS - WOLFRAM Cellular Automata

SETS

LOGIC

TILINGS

SEQUENCES - ~~ARRAYS~~

ARRANGEMENTS

ARRAYS - MATRICES

UNITS
DIMENSIONAL ANALYSIS

MATHEMATICS IS A MEDITATION

A LADDER TO THE DIACHRONIC

APPLIED MATH: SYNCHRONIC TAKING FROM THE DIACHRONIC

MATHS.WPD March 7, 2008

MATHEMATICAL TOPICS

ARCHIMEDES' TUB
- TUB PARAMETERS
  - SHAPES, ENERGY, FREQUENCIES, MONEY

DIMENSIONALITY
- VECTORS:
  - DIRECTION: M,L,T; G,c,ħ; $\sqrt{2},\sqrt{6},3$
  - MAGNITUDE: α,μ,S; $\alpha^u \mu^v$

UNITS

COSMIC TEMPLATES

PLANETS

MATH, MYTH, METAPHOR

MATH vs SCIENCE

SEQUENCES
- RECURSION and EXPLICIT
- SUMMATION

NUMBERS
- PRIMES
- FIBONACCI
- RAMANUJAN
- FULCRUM
- BELL

ARRAYS
- CARTESIAN
- YANGHUI
- RHOMBOIDS

RANDOMS
- PROBABILITY DISTRIBUTIONS

META LOGICS

MATHEMATICS

BOOK ONE

IN THIS CULTURE, I
TAKE REFUGE IN MATHEMATICS

MATHEMATICS BOOK ONE

I NTRODUCTION AND PHILOSOPHY — QUOTES
PYTHAGORAS AND NUMBER
COUNTING AND MEASURING
DISCRETE AND CONTINUOUS
INTERPRETATIONS OF ZERO — Canto ∞ Nagarjuna
INTERPRETATIONS OF ONE
ABSTRACTION ∞ GENERALIZATIONS
PATTERNS ∞ SETS

II NUMBERS — Real Book on Numbers
NAMES FOR ~~LARGE AND SMALL~~ NUMBERS
LARGE NUMBERS — googolplex — Archimedes, Hindu, Kalpa, Mada
TABLES ~~PRIMES~~, OF VALUES of π, PRIMES
Some RATIOS AND RECIPROCALS
In NUMERICAL APPROXIMATIONS
OCCULT NUMBERS

REPRESENTATIONS
BABYLONIAN — NUMBER BASES
ROMAN
~~HINDU~~
MAYAN
~~Egyptian~~

$\ln 2 = x$
$e^x = 2$
$2^{1/x} = e$

Does mathematics have a context?

Ithibut et al
A philosophy of mathematics

Why does mathematics work?

Because the equals sign (=) can
stand for a great many symmetries
[fulcrums]

Recently arrived: Kronikers δ_0
and Dirac functions - more than the
traditional =

Equality = is a special case of
Mutual containment $\supset\subset$

Math & Science
Top Down | Induction
Bottom up

English St. George + Add
Scotts St. Andrews × Multiply
} Many words

Reconciled by a Scottsman, Napier, with the invention of logarithms
then the U.K.

Yet, There was Bonnie Prince Charlie, (but he didn't understand logarithms)

PAPYRUS.WPD February 4, 1999

ON MATHEMATICS

The famous Rhind Papyrus, a mathematical document written somewhere around 1650 B.C.E. by a priest-scribe called Ahmes, begins by advertizing itself as "a complete and thorough study of all things, insight into all that exists, knowledge of all secrets." This claim brings to mind the claims of present day mathematical theorists who say they are on the verge of compiling "a theory of everything". This affirms for us the observation that those familiar with mathematics have over the millennia felt that they are the ones before all others who are operating in a domain of universal validity. We might ask, what is the source of this age long hubris of mathematicians about mathematics? Perhaps their sense of certainty derives not only from the fact that mathematics is the most precise and comprehensive representation of the world so far invented/discovered by humans, but also from the fact that of all knowledge mathematics has the longest shelf life. Go into any library. In these days almost every section except mathematics becomes dated and even obsolete in the course of a few decades. Mathematics alone grows without needing to be revised. After almost 4000 years Ahmes' math is still valid today (although notations have improved and shortcuts have been designed).

Mathematics may be compared to a generalized or universal genome. Whereas the genes of the DNA spirals encode the properties of living organisms, mathematics encodes the properties of all that physically exists. For example, in particle physics mathematical groups encode the structure of the standard model. The question naturally arises, if the template codes of bio-organisms are located in the chromosomes, where are the template codes of the fundamental particles located? Or put more generally, where does mathematics exist? Math seems to be of the world but not in it. [The obverse of the monk or mystic who is in the world but not of it] We here recall Plato's postulating a non-physical realm in which archetypes exist. Are the formulae of mathematics and the laws of physics to be included among the archetypes that dwell in this Platonic realm? And the key question, is this realm material or non-material? [1]

However, this lofty view of mathematics is not shared by most human beings. On the contrary it is held that mathematics is not essential or even useful for most. The great psychologist Carl Jung felt that:

> "It is an asinine prejudice that mathematics has anything to do with the training of the mind... Mathematics is not a function of intelligence or logic,. You also find a mathematical talent in individuals that are idiotic in every other respect. So I think you waste your time absolutely when you try to study mathematics.

This is a view that deserves consideration for it insinuates that there are other realms (such as Jung's realms of myth and dreams) that operate independently of any mathematical ground. Some of us are adept at tuning to the set precise physical domain described by mathematics and others to the open misty domain of mind and spirit. Are we dealing with two realities or with but one? And if two how do they interrelate, and why should mathematics be absent in one and present in the other ? Or if one reality, why is mathematics manifest only in a portion?

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[1] In the case of objects possessing the attributes of life, both the genotype and the phenotype are material. In non living objects it appears that only the phenotype is material. Is this a valid and meaningful distinction?

WHY DOES MATHEMATICS WORK ?

get quotes on this question.

Pythagoras answer was that the ultimate nature of reality is number. Before matter, before space, before time, even before there was thought, there was number. Kronecker said that, "God created the integers, all else has been the work of man. But Sir James Jeans held that God was more than the creator of numbers, God was a mathematician. Others go futher and say that God is not only a mathematician, God is Mathematics. All of which is to affirm Pythagoras view that at the most basic level the nature of the physical cosmos derives from the properties of number.

There are several levels to the properties of number. Mathematics begins by considering the quantitative aspects of numbers and how they are combined. This area was called arithmetic. Next, intrinsic properties of numbers, relational properties and classes of numbers are considered, this subject is called Number Theory. From the arithmetic and number theoretic properties, new kinds of numbers are derived and abstractions and generalizations of all properties are constructed. This is what most mathematics in the past few centuries has been about. A third level of properties are the qualitative properties of number. This area, called numerology, has been avoided and denigrated by most mathematicians as having no rigorous basis. But the answer to why mathematics works might also require the unrecognized qualitative properties of number.

But beyond number are the plethora of things in the world . The question of why mathematics works, allowing the prediction of the properties and behavior of things involves the processes of referencing the observed properties of things to the properties of number. That is, how this referencing is effected plays an important role in why mathematics works.

Apologies to
Kronecker

GOD CREATED THE INTEGERS

THEN THEY SELF ORGANIZED

DISK ALTCODE
H AGOR\WHYMATH1.WPG
FILE
LDER

GEOMETRY AND THE CONTINUUM

Geometry is an abstraction of certain aspects of sensory experience. And being an abstraction, it is a simplification. Assuming, as did the Greeks, that a point has no size, only position, a line has no breadth, only length, a plane has no thickness, only extension, many necessary properties of the physical entities in the world were derived. These are the properties of what we call **space**. It is to be emphasized, however, that space itself is not a direct sensory perception, it is an inference derived from a sub-set of perceptions that are largely visual. Traditional geometry derived many of the arrangements that are possible in space but ignored such sensory experiences as **force** and **time**.

Over centuries the perspectives of Greek, i.e. Euclidean, geometry have been extended. This was done by abstracting additional sensory experiences, but we called these extensions physics instead of geometry. Physics continued to use traditional geometry as a tool, but physical experience led to questioning the universal applicability of such geometry. This had the effect of liberating geometry, allowing it to grasp that the geometry of Euclid was but a special case of conceivable geometries. Then physics in the 20th century discovered that those portions of physics thought to have been beyond geometry can properly be included within generalized geometries. So geometry again is the vehicle for describing much of physical experience, but it is a different geometry, one called general relativity. Another approach to the inclusion of size, thickness, force into geometry has been in the contructs of Buckminster Fuller. His is a possible discrete or finite geometry.

But a common property of all geometries, be they those of Euclid, Gauss, Riemann, or later is their predication of a continuum. A possible discrete or finite geometry may be inherent in fractals. In mathematics this has resulted in two never completely reconciled views: that of arithmetic, algebra, set theory, ...discrete mathematics; and that of geometry, calculus, analysis, ...continuum mathematics. (Of course there are both discrete and continuous sets and discrete [finite] and continuous groups). But the two mathematics, both of which describe parts of the physical world leave us with the on going question: Is the world a continuum or is it quantized? analogue or digital? In the early years of the 20th century, a physicist, Max Planck, may have opened the gate to bringing our understanding of the physical world down on the side of the discrete violating centuries of both geometry and common experience.

In addition there is a basic relationship of the discrete with the finite and the continuum with the infinite. If the world proves to be discrete, does this invalidate not only our geometries but also our theologies?

The discontinuous and the finite are the modes by which God accomplished his task. The continuous and the infinite are the modes resorted to by our intellects, which are incapable of investigating the gaps in nature. –Arnaud Denjoy

GODMATH.WPD 2002-03-24

A NEW HAGIOLOGY?

In a survey of scientists in various fields, it was found that the percentage of mathematicians who believed in God was higher than the percentages of those in all other disciplines. [Lowest percentage was among biologists.] This linkage between God and mathematics may go back as far as Pythagoras who was both mathematician and theologian. But while mathematics is included in the roster of sciences, sometimes even labeled "The Queen of the Science", it is distinctly different from the other sciences. Like other sciences, it has roots in our experience of the material world, but unique among the sciences, it includes recognitions of the order of things that transcend physical perception. And it is these transcendent recognitions that are the basis of how mathematics works in explaining the physical world. But it is also these transcendent recognitions that relate mathematics and theology. So it is not altogether surprising that many mathematicians are religious and that many members of the clergy are mathematicians.

> God is a mathematician
> –Sir James Jeans

But mathematical clergy and religious mathematicians are for the most part not main stream or party line thinkers in either religion or mathematics. Both seem to be searching for ways out of the perceptual-logical box that imprisons both our intellect and our spirit. Einstein said, "I want to know how God created this world. I want to know His thoughts, the rest are details". He also said, "Imagination is more important than knowledge", which is to say that what is outside the box is more important than what is within the box. His faith was that mathematics is a way to get out of the box.

> Ultimate reality is number
> –Pythagoras

Perhaps the best known clergyman who was also a mathematician was the Reverend Charles Lutwidge Dodgson, aka Lewis Carroll, the author of Alice in Wonderland. Dodgson wrote an innovative treatise on logic or rather "meta-logic". His way out of the box was to escape the confines of Aristotelean logic. His non-sense verse and absurd caricatures in Alice were popularizations of an anarchical way of thinking, that today is recognized as essential to the creation of alternatives.

> Nonsense is a way of looking at existence that is akin to religious humility and wonder.
> –G. K. Chesterson

Another mathematical clergyman was the Reverend Edwin A. Abbott. [Flatland?]

Abbe LeMaitre

Roger W. Boscowich Jesuit

MATH01.WPD December 14, 1999

see also 99#7, #8

SOME NOTES RE MATHEMATICS

discovery of Nothingness #56

There are two ur-sources of mathematics: counting and measuring. Counting led to arithmetic, measuring to geometry, and from the marriage of arithmetic and geometry the rest of mathematics was born. Counting was literally digital, it gave rise to the natural numbers or integers. Against the discreteness of the integers, measurement introduced the continuous, leading to the real numbers–every point corresponding to a numerical value. Thus,

DISCRETE	CONTINUOUS
Arithmetic	Geometry
Integers	Real numbers
Digital	Analog
~~Multiplicity~~	~~Diversity~~

...and then came along the offspring, algebra, topology, analysis, ...

discrete gaps continuous continuum

The continuous, geometry, was interested in patterns and dimensions, while the digital was interested in quantity and magnitude. It was Descartes, with his analytic geometry, who arranged the invasion of shape and pattern with number and scale. But now, Mandelbroit, with his fractals, is arranging the counter invasion of magnitude and scale with dimension and pattern, resulting in discrete patterns and regression.

We can note:

Scale : Dimension :: Value : Attribute

For example, the universe is a fractal in that it exhibits the same patterns on different scales. Thus exhibiting a certain type of symmetry, or even economy. It is the gaps, the nothingness, that give existence to the discrete. The content of non-sameness that gives existence to patterns. Thus the discrete and continuous represent two species of existence, and their marriage creates the world.

In the quadrad: Pattern, Dimension; Scale, Aggregate, both the discrete and continuous appear twice.

Notes 99/09/21, Little America, Flagstaff, AZ

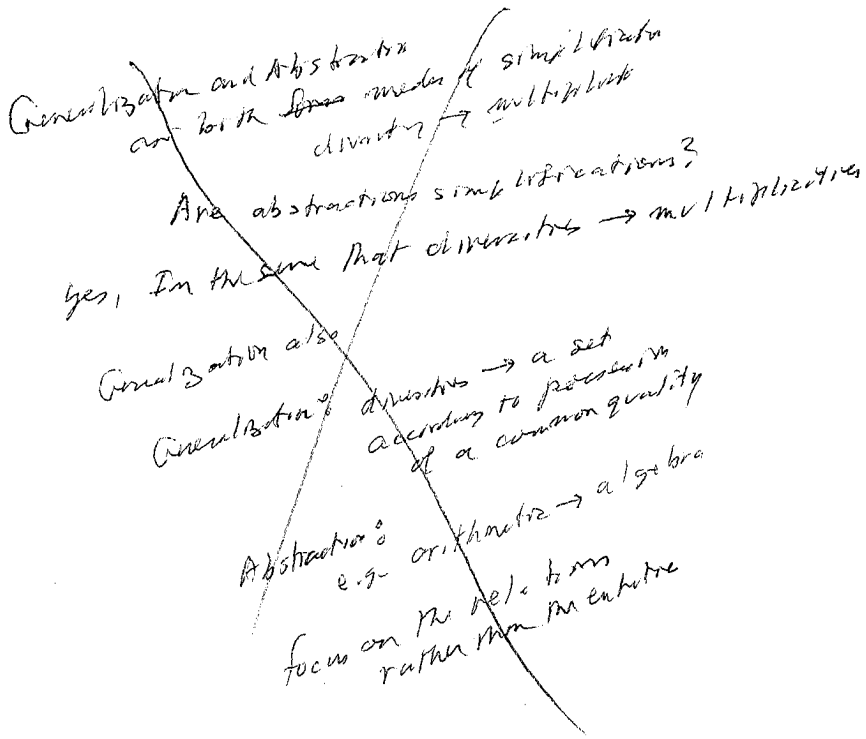
From The Mathematical Experience:

Algorithmic ~~vs~~ Dialectic

or Computable ~~vs~~ Existential

$\sqrt{2}$ exists as the diagonal of a square ~~one~~ of side one — Existential

$\sqrt{2}$ does not exist as the ratio of two numbers [fraction] — Algorithmic



LEIBNIST MACH

TOP DOWN SCIENCE

COUNTING	MEASURING
QUANTITY	QUALITY
MULTIPLICITY	DIMENSIONALITY [DIRECTION]
PURE NUMBER	UNITS

$SCALE^{DIMENSIONALITY} \sim Me^{ic}$

The c indicates the unit, label, for M

$\#^{label}$

∃ many qualities for which dimensionality has not been defined
i.e. related to other dimensionalities

2 requirements:
For a quality to be measurable:
1) it must have a "coherent" dimensionality
i.e. its dimensionality must be related to others
2) a tool, "yardstick" for actual measuring and a unit

Whence diversity?
How does abstraction fit in?

Pythagoras and Planck

Back at the beginning of the present age around 600 B.C.E. Pythagoras felt that the natural integers themselves should suffice for constructing the universe. He was set back and dismayed when real numbers like $\sqrt{2}$ intervened. Even before his death the continuum of real numbers began to take over and prevailed until the beginning of the 20th century. Then at the beginning of the present age, Max Planck found that discreteness must be re-introduced. The continuum had failed. Pythagoras was justified when Planck showed that basic physical realtionships were governed by discrete, not contiuous, quantities. Of course, Pythagoras' misinterpretation was that it was the integers themselves that sufficed, when it was discreteness, one of the properties of the integers that was the essence. Today as digital replaces analog, Pythagoras is firmly back in business.

Sometimes many centuries intervene between the writing of the first sentence in a worldview and the writing of the second, with many by-paths being explored in the while. Today it might be possible to add to what Pythagoras began since there have been several contributions to his approach in recent years. It is fair to call such modern natural philosophers as Planck, Eddington and Dirac followers of Pythagoras, since parts of their work are clearly "Pythagorean". They have taken number to be the starting place of ultimate reality.

Today's Pythagoreanism begins with the so-called fundamental constants of physics. We might say that in the beginning God created the numbers h,G,and c, and from them all else follows. If the constants had had different values, then our universe would have been different. In fact we might not have even been here to contribute the consciousness feedback that gives the universe one of its modes of existence. In addition to re-introduction of the discrete, Planck took the fundamental constants, h,G, and c and using dimensional analysis derived a system of "natural units" with which to describe the universe. When translated into these units relations between the masses, sizes, and life times of physical entities were seen to reveal symmetries and patterns that bring to mind Pythagoras' own constructions of musical tones and their harmonics.

The dimensionalities that physicists feel best describe most phenomena are mass M, length L, and time T. Each of the fundamental constants possesses a dimensionality built up from these factors:

$$[h] = [ML^2/T],\ [G] = [L^3/(MT^2)],\ [c] = [L/T].$$

By suitably combining the fundamental constants, Planck defined units of mass, length, and time. In terms of cgs units the logarithms to base ten of these values are:

Planck mass = -4.263110 grams
Planck length = -32.392455 centimeters
Planck time = -42.869276 seconds

In Planck units, the values of h, G, and c are each 1.

PYTHKOAN,WPD NOVEMBER 5, 1999

A PYTHAGOREAN KOAN

In Zen monasteries chelas are given koans such as "What is the sound of one hand clapping". These are exercises in how to escape conventional and traditional patterns of thinking, usually by positing absurdities or impossibilities. We can imagine that in the Pythagorean Academy about 500 B.C.E. something similar was done to enable the apprentices to attain greater freedom of thought. But more likely a Pythagorean koan, rather than being a logical absurdity or impossibility, had to do with a geometrical visualization, for example:

Visualize a prolate spheroid. Allow this spheroid to spin rapidly about one of its minor axes. What will be the resulting apparent "outer" figure? After reflecting the apprentice comes up with: The outer figure would be an oblate spheroid having the diameter of the prolate spheroid's major axis. Very good. Now visualize an oblate spheroid and allow it to spin rapidly about one of its major axes. What will be the apparent outer figure? The apprentice answers more quickly: The result would be a sphere with its diameter equal to the oblate spheroid's major axis. Good again. Now tell me what would be the apparent "inner" figure in each case?

Here the apprentice hesitates. What is the difference between outer and inner? Hmmm. The outer represents the portion of space occupied by the spheroid part of the time. It flickers giving a ghostlike semi-transparent image, like the spherical image in the spinning oblate spheroid case. Now what is the inner? The inner is the portion of space occupied by the spheroid all of the time. Its image appears to be solid and constant, not flickering like the outer image. OK, so what is the inner image of the spinning prolate spheroid? It is a sphere having a diameter equal to the minor or spin axis of the prolate spheroid. And what is the inner image of the spinning oblate spheroid? It would have to be a prolate spheroid with major axis equal to the major or spin axis of the oblate spheroid and with minor axis equal to the minor axis of the oblate spheroid.

Now, what can you say about the apparent images as related to the rates of spin? Well, off hand I would say that the faster the spin rate the less flicker and the more solid the outer image would appear. At some high rate of spin the inner image might even be obliterated. But it is hard to say at what rate of spin the inner image would be most enhanced. Most likely at a much slower rate than the optimum for the outer image.

You are leaving out an important factor in all of these perceptions. What are you ignoring? The apprentice is perplexed, reviews the visualizations, then hits on: How about the existence of some basic subjective frequency internal to the observer that leads to what is considered to be a fast or slow spin rate?

Very good! Now explain the relation between perception and reality.

Riding the Range Metaphor → MATH

MODEL & THEORIES

EPI

herding data

Corralling experience

50

Straps

lost sheep

EPION01.WPW DISK:EPIONTOLOGY November 29, 1993

expln

phase See 13-93 EPISTEMA.WPW

An amplification of the two epistemological levels:

- The basic problem of scientific explanation is to find the best model that fits the observations.
- The basic problem of ~~applied~~ mathematics is to provide a smorgasbord of models from which the scientist may select the most suitable.
- The basic problem of philosophy is to supply one or more meta-models which can contain all extant models.

→ Stock yards knowledge

There seem to be several species of existence: material existence, informational existence, numerical existence, spiritual existence, theo existence (the non-existent existence of God), ... We cannot assert whether these different species of existence are independent or exclusive or affirm in what ways they are interdependent. For example, we have no instances or experience of pure information, information totally detached from matter. Materialists maintain that information is an attribute of matter, others hold that matter is "frozen" information. A proper meta-model allows not only for the possible varieties of existence and also for the conceivable ways in which the varieties may be related or unrelated.

Returning to mathematics, in saying that the basic task of mathematical physics (or biology, ...) is to provide a smorgasbord of models from which the scientist may select the most suitable, mathematics is not "queen of the sciences", but is a chef to the sciences. But mathematics is more than a servant to the sciences. It is itself an independent and alternate approach to understanding. Theories are generally tied to observations at several points, but mathematics may sustain an existence independent of observations, data, and sensory experience. The Pythagorean view is that math does not derive from the sensory, but that it derives from number and that number has a different sort of existence than material objects.

also Kant's views

the essence of

ON MATH

Geometry ~ the contiguous

Number ~ the non-contiguous

FRACDIM1.WP6 DISK:MATH June 10, 1991, rev April 4, 1996

INTRODUCTION TO MEASURE AND FRACTAL DIMENSION

It has been a matter of much amazement on the part of philosophers from the Greeks to Einstein that the structures of pure thought we call mathematics appear to be isomorphic to the physical world. That mathematical constructs can be successfully used to explain and predict physical phenomena is itself a phenomenon that up to the present has eluded explanation. However, there are hiati in the successful representations of the world by mathematics. In particular several difficulties arise when treating the infinitely large and the infinitesimally small. While the geometry of Euclid, for example, has been most useful in the solution of myriads of problems, its sizeless points, diameterless lines, and thickless planes frequently lead to singularities and non-sensical conclusions. When mathematical thinking turned to the paradoxes implicit in the infinitely large and small, it opened new regions to the successful mathematical representation of the physical world.

There have been many approaches to these paradoxes. Some, which should be mentioned, are Cantor's studies of transfinite sets, Hausdorf and Besicovitch's dimension, Lesbegue's theory of measure, and Mandelbrot's fractal dimension. Also related to this area are the finite difference calculus and some of the work of Buckminster Fuller. All are concerned with bridging the gap between the sizeless elements of classical geometric thought and the finite elements of physical experience.

The development of the concept of fractal, pioneered by Mandelbrot, has led to new isomorphisms between the formulae of mathematics and the laws and patterns of nature. Complex patterns in nature, such as shore lines and mountain contours, always considered too complicated to be mathematically treated, have suddenly been made accessible through relatively simple expressions. At the present time not only are unexpected new isomorphisms being generated, but reexamination of classical models in such areas as geology and astronomy has led, through the fractal approach, to new and deeper insights.

In addition to the sizeless points of Euclid vs. the finite atoms of nature, there is the continuum vs the discretum: the continuousness of geometry vs. the discreteness of arithmetic and algebra; the analogue vs. the digital; in space, extension vs. separation; and in time, duration vs. interval. There are two worlds to be brought together.

Why mathematics brings

See also 1999 #7, #8, #55

ATHMATH.WPD December 31, 1999

MATHEMATICS AND ATHROISMATICS

Mathematics is based primarily on various abstractions derived from quantity (number) and measurement (scale and dimension) and their multiple relations to one another. Athroismatics is based on various abstractions of the relations between parts and parts, parts and wholes, and wholes and wholes. While the abstractions derived in mathematics overlap those of athroismatics, there are many distinctive domains. Set theory

Some of the areas peculiar to athroismatics include:

Boundaries
- Interfaces
- Verges
- Watersheds
- Limits

Dyads
- Opposites
- Symmetries
- Duals
- Dialectics

Triads
- Nodes, Links, Traffic, cargo

Containments
- Whole ⋑ Parts
- Part ⊃ Whole
- Wholes ⊃ Wholes

MUTUALITIES

Relations
- Horizontal
- Vertical

Loops
Regressions
Mutualities

Processes
- Repetition
- Iteration
- Recursion
- Regression

Logics
- Aristotelean
- Quadric
- Nagajunian

Metataxis
Order, Organization

(1)

APHORISMS RE ILLUSION

MAN MUST RECOGNIZE THAT HE IS FAR REMOVED FROM REALITY. --DEMOCRITUS

COLOR, SWEETNESS, BITTERNESS ARE ILLUSORY, ONLY ATOMS AND THE VOID ARE REAL. --DEMOCRITUS

NOTE: THE VOID IS REAL

THERE REMAINS THE FINAL REFLECTION, HOW SHALLOW, PUNY AND IMPERFECT ARE EFFORTS TO SOUND THE DEPTHS IN THE NATURE OF THINGS. IN PHILOSOPHICAL DISCUSSIONS, THE MEREST HINT OF DOGMATIC CERTAINTY AS TO FINALITY OF STATEMENT IS AN EXHIBITION OF FOLLY.
--WHITEHEAD

"REALITY IS THAT ENSEMBLE OF PERCEIVED EVENTS WHICH AN INDIVIDUAL HAS LEARNED TO RECOGNIZE AS OCCURRING OUTSIDE HIMSELF." --ANON

reportedly

PHYSICAL REALITY IS NOT ACCESSIBLE PER VISUALIZATIONS. ONLY ABSTRACT MATHEMATICAL RELATIONS ARE CAPABLE OF REPRESENTING PHYSICAL EVENTS. --R.P. KROON

Math

SPIRITUAL REALITY IS NOT ACCESSIBLE PER VISUALIZATIONS, ONLY ABSTRACT SYMBOLIC RELATIONS ARE CAPABLE OF REPRESENTING SPIRITUAL 'EVENTS' L.K.

THE SEPARATION OF TIME FROM SPACE IS ARBITRARY.
--MAX BORN

And so is the merge

IF ALL MATERIAL THINGS DISAPPEARED OUT OF THE UNIVERSE, CLASSICAL PHYSICS SAYS THAT SPACE AND TIME WOULD REMAIN. RELATIVITY SAYS THAT TIME AND SPACE DISAPPEAR TOGETHER WITH THE THINGS. --EINSTEIN

TIME HAS COME INTO BEING ALONG WITH THE UNIVERSE.
--PLATO

Math

THE NATURE OF THINGS IS NUMBER.
--PYTHAGORAS

(9)

THE GREAT ARCHITECT OF THE UNIVERSE NOW BEGINS TO APPEAR AS A PURE MATHEMATICIAN. --JAMES JEANS

GOD IS NOT A MATHEMATICIAN; GOD IS MATHEMATICS.
--LI KIANG

OUR KNOWLEDGE OF PHYSICS IS MATHEMATICAL ; IT IS MATHEMATICAL BECAUSE NO NON-MATHEMATICAL PROPERTIES OF THE PHYSICAL WORLD CAN BE INFERRED FROM PERCEPTION. --BERTRAND RUSSELL

RELATIVITY AND WAVE MECHANICS CAN ONLY DRAW A PURELY MATHEMATICAL PICTURE. --JAKI

ABSTRACT MATHEMATICAL CONSTRUCTS SEEM TO BE TODAY THE ONLY WAY, NOT TO REACH, BUT TO REPRESENT THE TRANSPHENOMENAL PLANE. --CAPEK

THE ONLY 'REAL' PHYSICAL CONCEPTS ARE NUMERICAL.
--R.P. KROON

ANY PHYSICAL CONCEPTS OTHER THAN NUMERICAL ARE ONLY AN ILLUSION. --QUELON

THE SPACE-TIME FRAME IS SOMETHING OVERLAID BY THE OBSERVER ON THE EXTERNAL WORLD. WE MUST ENDEAVOR NOT TO LOSE SIGHT OF ITS FICTITIOUS AND ARBITRARY NATURE. --EDDINGTON

SPACE AND TIME ARE GRANULAR, NOT CONTINUOUS.
--POINCARE

GOD MADE THE INTEGERS; ALL ELSE IS THE WORK OF MAN.
--KRONECKER

EVERY QUANTITATIVE OBSERVATION, EVERY OBSERVATION MAKING USE OF MEASUREMENT IS, BY ITS NATURE, DISCONTINUOUS. --SCHRODINGER

REFO3.WPD October 23, 2004

Above all languages there is a universal language by which all of them are validated, the language of Numbers. This is the divine tongue, the instrument of the Logos, the source of absolute Truth. from which all others derive their vitality, so that each separately may form a cultural individuality by bringing its own originality.

–Boris Mouravieff
Gnosis vIII p 16

~~get full quote~~ this is

Hans Bethe devoted many solitary afternoons to his passion: Numbers
" I think it is very useful for keeping me young" (" " 1996)

"Science is always more unsolved questions"

The discontinuous and the finite are the modes by which God accomplished his task. The continuous and the infinite are the modes resorted to by our intellects, which are incapable of investigating the gaps in nature.
-Arnaud Denjoy

The calculus is indiscrete mathematics.
-LK

		# species of cellular automata products	
Discontinuity	Discontiguity	0	uniformity
Uni continuity	Uni contiguity	1	fractal, repetitive
Multi continuity	Multi contiguity	1< <T	sub-patterns
Total continuity	Total contiguity	T	Random Potential

Math: axiomatic systems
self-consistent
Neither right nor wrong
only special cases
Top Down

Science: reductionist
collection of experiments, observations → inductive model
falsifiable or probabilistic
Bottom up
can be locally valid, but also generally wrong

E. T. BELL Quote on 2 valued logic
See MATH volume IV under VENNS
Note15.WPD Oct 5, 2004

WHYTE QUOTE ON PATTERN

SOMATH01.WP6 JUNE 28, 1997

SOME MATHEMATICS

Mathematics has developed from the manipulation of entities by processes. The entities being the natural numbers or postitive integers and the processes being the basic arithmetic operators of + and -, x and /, ^ and √. (i.e. addition, subtraction, multiplication, division, powers and roots.) The interaction of these operators with the positive integers has generated new classes of numbers: the negative integers from + and -, the rational numbers from x and /, the irrational numbers from ^ and √, The totality of these numbers are contained in an even larger class, the real numbers. A class that arises in the marriage of arithmetic and geometry. From the interaction of - and √ come imaginary numbers, which combine with real numbers to give complex numbers. [The end of the line?] But not only new classes of numbers have emerged, but new operators emerged, such as log, antilog.

Arithemetic calculations usually involve a great many numbers but only a few operations. Infinite series and infinite products usually involve only one or two operations together with an unlimited number of integers.
For example,

(1)
$$e^x = 1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\frac{x^4}{4!}+\ldots$$

in which there are but ~~two~~ 4 operators but unlimited positive integers.

However, there are some interesting arithemetic sequences that involve only one number and consequently constitute infinite regressions. Certain classes of continued fractions and continued roots form such regressions. For example,

(2)
$$\Phi = 1+\frac{1}{1+}\ \frac{1}{1+}\ \frac{1}{1+}\ \frac{1}{1+}\ \ldots = 1.618034\ldots$$

the continued fraction for the golden ratio, involving only the number one and the two operations '+' and '/'.

Or an example of a continued root,

(3) $$\Phi = \sqrt{1+\sqrt{1+\sqrt{1+\sqrt{\ldots}}}} = 1.618034\ldots$$

again using only the number one and two operators.

Equation (2) may be generalized,

(4) $$F = \frac{1}{n+}\ \frac{1}{n+}\ \frac{1}{n+}\ \frac{1}{n+}\ \ldots = \frac{\sqrt{n^2+4}-n}{2}$$

where n may be any number, real or complex. The proof consists in noting that F = 1/(n+F). The quantity F has the properties:

(5) $$F + n = \frac{1}{F}, \qquad F + \frac{1}{F} = \sqrt{n^2+4}, \qquad F = \frac{\sqrt{n^2+4}\ - n}{2}$$

These are recognized as properties of the golden ratio when n is given the value +1.

We may also generalize equation (3). Defining R as,

(6) $$R = \sqrt{n+\sqrt{n+\sqrt{n+\sqrt{\ldots}}}} = \frac{1+\sqrt{1+4n}}{2}$$

The proof consists in noting that whenever the sequence converges, $R^2 - R = n$. It may be shown that R has the following properties for all numbers real or complex:

(7) $$R = \frac{1\ +\ \sqrt{1+4n}}{2}, \qquad n = R^2 - R$$

What is of interest here is the emergence of numbers such as ϕ from an infinite regression.

Using the values for F from equation (5) and the values of R from equation (7), the following tables may be constructed:

TABLE I

n	0	1	2	6	12	20	30
F	1	ϕ	$\sqrt{2} - 1$	$\sqrt{10} - 3$	$\sqrt{37} - 6$	$\sqrt{101} - 10$	$\sqrt{226} - 15$
R	1	$1+\phi$	2	3	4	5	6

In the table, $\phi = 0.618034...$
$n = m(m-1)$; $F = \sqrt{[1+(n/2)^2]}-n/2$, $R = m$

TABLE II

$$R(1) = F(1) + 1$$
$$R(3) = F(3) + 2$$
$$R(7) = F(5) + 3$$
$$R(13) = F(7) + 4$$
$$R(21) = F(9) + 5$$
$$R(31) = F(11) + 6$$
$$\cdots\cdots\cdots$$
$$R(n^2-n+1) = F(2n-1) + n$$

$F(1) = \varphi = 0.618034$
$F(2) = \sqrt{2} - 1 = 0.4142136$
$\sqrt{10} - 3 = 0.1622777$
$\sqrt{37} - 6 = 0.0827625$
$\sqrt{101} - 10 = 0.049876$
$\sqrt{226} - 15 = 0.0332296$

$\varphi = \frac{\sqrt{5}-1}{2}$

$1+\varphi = \frac{\sqrt{5}+1}{2}$

NUMBERS

Names for the Very Big and the Very Small

The current scientific literature frequently cites prefixes for units that are unfamiliar to those individuals whose scientific education dates from a few decades in the past. As an aid to readers who may have experienced this frustration, here are the latest official prefixes with symbols and probable origins.

Not so long ago, scientists were content with units that ranged from 10^{-12} to 10^{12} — pico to tera. But femtosecond light pulses are now routine, and recently, voltage measurements were reported in the milliatto range, for which there is now an official name, "zeptovolts," When more names are needed, they will be coined by the International Bureau of Weights and Measures in France, which is the final authority on physical units.

(Editor's note: If a reader knows the derivation of "exa" or "peta," please drop us a line.) ■

10^{24}	yotta	Y	adapted from Greek *okto* (eight) —for the power of 1000
10^{21}	zetta	Z	adapted from Greek *hepta* (seven)
10^{18}	exa	E	from hexa 1000 ?
10^{15}	peta	P	from penta 1000 ?
10^{12}	tera	T	from Greek *teras* (monster)
10^{9}	giga	G	from Greek *gigas* (giant)
10^{6}	mega	M	from Greek *megas* (large)
10^{3}	kilo	k	from Greek *chilioi* (thousand)
10^{-3}	milli	m	from Latin *milli* (thousand)
10^{-6}	micro	μ	from Greek *mikros* (small)
10^{-9}	nano	n	from Greek *nanos* (dwarf)
10^{-12}	pico	p	probably from Italian *piccolo* (small)
10^{-15}	femto	f	from Danish and Norwegian *femten* (fifteen)
10^{-18}	atto	a	from Danish and Norwegian *atten* (eighteen)
10^{-21}	zepto	z	adapted from Greek *hepta* (seven)
10^{-24}	yocto	y	adapted from Greek *okto* (eight)

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Å = Angstrom = 10^{-8} cm, 10^{-10} m 10 Å = 1.0 nanometers

μ = Micron = 10^{-4} cm, 10^{-6} m

red 780 Å or 780 nm

1 Kiloton = 4.2×10^{12} joules (S&T Oct 96)

10^{10} = *ten* billion (billion = 10^9)
10^{11} = *one hundred* billion

then,

10^{12} = *one* trillion
10^{13} = *ten* trillion
10^{14} = *one hundred* trillion.

This is the system that is used in the U.S.A. In order to go beyond, we need special names for the powers 10^{15}, 10^{18}, etc. Here they are, at least as far as Webster's *Unabridged Dictionary* lists them:

Power	Number word	Latin root	Numerical equivalent of root
10^9	billion	bi-	2
10^{12}	trillion	tri-	3
10^{15}	quadrillion	quater	4
10^{18}	quintillion	quintus	5
10^{21}	sextillion	sex	6
10^{24}	septillion	septem	7
10^{27}	octillion	octo	8
10^{30}	nonillion	novem	9
10^{33}	decillion	decem	10
10^{36}	undecillion	undecim	11
10^{39}	duodecillion	duodecim	12
10^{42}	tredecillion	tredecim	13
10^{45}	quattuordecillion	quattuordecim	14
10^{48}	quindecillion	quindecim	15
10^{51}	sexdecillion	sexdecim	16
10^{54}	septendecillion	septendecim	17
10^{57}	octodecillion	octodecim	18
10^{60}	novemdecillion	novemdecim	19
10^{63}	vigintillion	viginti	20

Figure 10. Table of the special powers of 10 possessing simple names

Lore of Large Numbers — Philip DAVIS

Conversions from a multiple or submultiple to the basic units of meters, liters, or grams can be done using the table. For example, to convert from kilometers to meters, multiply by 1,000 (9.26 kilometers equals 9,260 meters) or to convert from meters to kilometers, multiply by 0.001 (9,260 meters equals 9.26 kilometers)

Prefix	Symbol	Length, weight, capacity	Area	Volume
exa	E	10^18	10^36	10^54
peta	P	10^15	10^30	10^45
tera	T	10^12	10^24	10^36
giga	G	10^9	10^18	10^27
mega	M	10^6	10^12	10^18
hectokilo	hk	10^5	10^10	10^15
myria	ma	10^4	10^8	10^12
kilo	k	10^3	10^6	10^9
hecto	h	10^2	10^4	10^6
basic unit	-	1 meter, 1 gram, 1 liter	1 meter^2	1 meter^3

U.S. USAGE

THOUSAND	10^3	KILO	k
MILLION	10^6	MEGA	M
BILLION	10^9	GIGA	G
TRILLION	10^{12}	TERA	T
QUADRILLION	10^{15}	PETA	P
QUINTILLION	10^{18}	EXA	E
SEXTILLION	10^{21}	ZETTA	Z
SEPTILLION	10^{24}	YOTTA	Y
OCTILLION	10^{27}		
NONILLION	10^{30}		
DECILLION	10^{33}		

10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a
10^{-21}	zepto	z
10^{-24}	yocto	y

QUINDECILLION 10^{48}

CENTILLION $10^{600} = (10^6)^{100}$

English Units

12 inches = 1 foot
3 feet = 1 yard
1 rod = 5 1/2 yards = 16 1/2 ft. ≈ 5m
1 furlong = 220 yards = 660 feet = 40 rods = 1/8 mile
1 mile = 5280 ft. = 1760 yards = 320 rods = 8 furlongs
Chain (surveyors) = 66 feet, 10 chains = 1 furlong ~~4 rods~~
= 4 rods

fathom = 6ft.
hand = 4"
Nautical Mile =

1 cup = 8 fl oz ≈ 240cc 1oz ≈ 30cc
1 pint = 16 fl oz = 2 cups
2 pints = 32 fl oz = 1 quart
4 quarts = 128 fl oz = 1 gallon

Counting by Twos

How much is a megabyte? Many people don't really know.

The problem started decades ago when computer professionals noticed that 2^{10} is very nearly equal to 1,000, and they began using the metric prefix "kilo" to mean 1,024. That was okay when computers were the domain of an elite group of high priests. Physicists, engineers, and ordinary folk could continue to use the prefix to mean 10^3 without worrying about what the computer gurus were up to. A kilogram remained 1,000 grams.

Now, nearly everyone uses computers, and even the computer world can't agree on what the prefixes actually mean.

When describing computer memory, most manufacturers use the term megabyte to mean 2^{20}, or 1,048,576 bytes of data. A few storage-device makers, however, insist on using the term to mean 1,000,000 bytes.

Similarly, some designers of local-area networks use megabit per second to mean a transmission rate of 1,048,576 bits per second, but telecommunications engineers use it to mean 10^6 bits per second.

The confusion stems from the use of prefixes designating powers of 10 for quantities expressed in powers of 2. The discrepancy mounts as you go to prefixes denoting higher powers.

To remove that nagging ambiguity, several international organizations several years ago started to work on finding acceptable names for prefixes related to powers of 2. Last December, the International Electrotechnical Commission voted to introduce the new prefixes kibi (Ki), mebi (Mi), gibi (Gi), tebi (Ti), pebi (Pi), and exbi (Ei), each one derived from the corresponding metric prefix and the word "binary."

So a gibibyte would be 2^{30} bytes, and a gigabyte would be 10^9 bytes. Your handy 90-millimeter (3 ½½ inch) diskette would be formatted for 1440 KiB, or 1.44 MiB (not to be confused with "Men in Black"). However, that doesn't resolve ambiguities in the use of the term "byte," which normally, but not absolutely always, means 8 bits.

What about the Y2K problem? Changing the K from kilo to kibi postpones the number crunch to the year 2048!

KALPAS AS UNITS OF TIME

While we know that the ancients developed systems for expressing large numbers, we are ignorant of any practical applications for which they needed large numbers. Particularly, we recognize the creativity of Archimedes in his "Sand Reckoner" and of unknown Hindu mathematicians in their development of the system of yugas and kalpas. Today we have many uses for large numbers to express social, economic, and scientific quantities and have developed a convenient representation by expressing them as powers of ten. For example, one billion = 1,000,000,000 = 10^9. In our culture, astronomy has long been the cradle of large numbers, for distances, numbers of stars and other objects, and for their ages. With recent focus on the cosmological importance of the age of the universe, (derived from its rate of expansion), it is of interest to see what modern age numbers might look like when expressed in terms of ancient units like yugas and kalpas, which were used to represent great lengths of time.

THE HINDU TIME SYSTEM

Brahma, the creator of the universe, is supposed to have a lifetime of 100 Brahma Years, each of 360 Brahma Days. The length of one Brahma Day is called a kalpa and is 4.32×10^9 earth years. This would make Brahma's lifetime equal to about 156×10^{12} earth years. It is held that at the end of such a period the world disappears to be replaced by a new world with a new Brahma. But there are subdivisions to the kalpa or Day of Brahma. One kalpa is equal to 1000 mahayugas, each of which would be of length 4.32×10^6 earth years or of 12,000 so-called Divine Years. This works out to one Divine Year = 360 earth years, [$360 \times 12{,}000 = 4.32 \times 10^6$] Each mahayuga consists of four yugas, each successive yuga is of decreasing length, containing increasing strife and conflict. The first yuga is the Krta Yuga whose length is 4000 Divine Years, [1,440,000 earth years]; the second is the Treta Yuga of 3000 Divine Years, [1,080,000 years]; the third is the Dvapara Yuga of 2000 Divine Years, [720,000 years]; and the last is the Kali Yuga of 1000 Divine Years, [360,000 years]. These add up not to 12,000 Divine Years, but to only 10,000 Divine years. The discrepancy is explained in terms of "yuga dawns and twilights".

THE 20TH CENTURY COSMOLOGICAL SYSTEM

For most of the 20th century, cosmologists have been using a model based on a "critical density"; critical in the sense that if exceeded, the universe will oscillate between a series of big bangs and big crunches, and if deficient, will expand forever. The jury is still out, but at the beginning of the 21st century, the smart money is on insufficient matter and eternal expansion. In this model we are concerned with three quantities:

1) An observable: the Hubble parameter, H_o measured in kilometers/second/megaparsec.
2) An interval of time called the Hubble Age, A, the time from the present back to an origin assuming constant rate of expansion at the present rate, measured in billions of years.
3) The so-called age of the universe, T, the time from the present back to the big bang, measured in billions of years.

These quantities are related as follows:

(H_o in km/sec/mpc) x (A in billions of years) = 978; and $T = 2/3\ A$

KALPAS AS UNITS OF TIME

The table shows the relations between the Hubble parameter, H_o; the Hubble time or age, A; the time since the big bang, the so-called age of the universe, T; with $\log_{10}$ values.

H_o km/sec/mpc	A Gyr	T Gyr	log T years	log T seconds
1) 550	1.8	1.2	9.079	16.578
2) 71.99	13.58	9.056	9.956955	17.456067
3) 75.46	12.96	8.64	9.936514	17.435626
4) 150.93	6.48	4.32	9.635484	17.134596
5) 4.1924×10^{-3}	233,280	155,520	14.191786	21.690898

1) Hubble's first value [Realm of the Nebulae p168, 1936]
2) Current value based on Cepheids [Friedman et al, 1999] This value = $(\alpha\mu S)^{3/2}\, t_o$
3) Value corresponding to 2 kalpas
4) Value corresponding to 1 kalpa
5) Value corresponding to "Lifetime of Brahma"
[log number of seconds in year = 7.499112]

Notes: The age of the earth is estimated to be about 4.5 Gyr which is close to one kalpa, which means the earth was born toward the end of the first Day. The sun is estimated to be about 4.7 Gyr, though a second generation star, it was still born in the first Day. The age of the universe 2) is "slightly" over two kalpas. Meaning we have been in the third Day of Brahma for 0.42/4.32 = 0.097 Day, that is for about 420 million years. This means the third Day of Brahma began 420 million years ago in the Silurian period, the age of first appearance of vertebrates, the fishes, and the first seedless land plants and ferns. Since the beginning of the third Day, there have been 97 mahayugas (out of 1000 per Day). The 98th mahayuga of the third day began 960,000 years ago in the Pleistocene epoch. This was the time of homo erectus well before homo neanderthalensis and homo sapiens. But since 960,000 years is less than 1,440,000 years of a Krta Yuga, we are still in a Krta Yuga, with 680,000 years to go. That should be good news for all of us.

If we define the Planck Age, P_A, as +43.268366 seconds, and take the total number of Brahmas, past, present, and future, B_N, as having the same numerical value as the lifetime of Brahma, B_L, in seconds = 21.690898, then $B_N \times B_L = +43.381796, \sim P_A$. [$\log_{10}$ values]

While the use of kalpas has no advantage over our powers of ten notation, it does help to put relative lengths of time into perspective by reducing billions and millions of years to days and hours. Since the big bang we are now only two hours and 20 minutes into the third Day of Brahma.

COSCUR.WPD November 1, 2003

COSMIC CURIOSITIES

1) Archimedes' Sand Reckoner 10^{62} grains of sand vs. Eddington's 10^{78} atoms

2) Cylinder–Sphere–Cone Vs Power–Energy–Force
(Alternate symbols for dimensionality)

3) Cylinder–Sphere–Cone
V= 3/2 1 1/2
$(\alpha\mu S)^{3/2}$ $(\alpha\mu S)$ $(\alpha\mu S)^{1/2}$
univ star atom

4) Invariant volume of two cones Invariant vs Constant

5) Time:
Period since the Big Bang measured in Kalpas
The week, the Schuster period and the rotation period
Kairos and Kronos, Mayan Haab and Tun (long count), Cyclical and Linear
Logic: Past conjunctive–Present disjunctive–Future neither conjunctive nor disjunctive
Past=fixed zone, Present=choice zone, Future=chance zone
Necessity Options Random Sunyata
The width of "NOW"

6) Conflict–Compromise–Synthesis

7) Continuity–Contiguity–Consistency

8) Repetition–Recursion–Regression [Iteration]

9) Confusion–Conviction–Corruption

10) Symbol–Metaphor–Archetype [Representation]
Nodes–Links, Patterns–Pictures, Processes–Games

11) Mathematical Musings:
The Great Pyramid Φ, π, $dV/dS = 0$
Fulcrum Numbers

12) Problem levels: Cosmic, Models, Representation, Tools
Nature, Weltanschauung, Language, Software

The "Chessboard" number = C

$$1 + 2 + 4 + 8 + \cdots + 10^{63} = \sum_{n=0}^{63} 2^n = \frac{1-2^{64}}{1-2} = 2^{64} - 1$$

[Archimedes' grains of sand = 10^{62}] = S

$$10^2 S \approx C$$

The Harmonic Series

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \cdots$$

$$\sum_{n=0}^{H} \frac{1}{n} \doteq \ln H + \gamma$$

where γ = Euler's constant = 0.577 215 664 901 ....

SPECIAL NUMBERS

$e =$ 2.71828182845904523536028747135266 about 30 places

$\pi =$ 3.14159265358979323846264338327 95

$\Phi =$ 1.61803398874989484820458683436564

$e^{-1} =$ 0.36787944117144232159552377016 1461

$\pi^{-1} =$ 0.31830988618379067153776752674 5029

$\Phi^{-1} =$ 0.61803398874989484820458683436 5638

$\ln e =$ 1

$\ln \pi =$ 1.14472988584940017414342735135306

$\ln \Phi =$ 0.48121182505960344749775891342 3974

$\log_{10} e =$ 0.43429448190325182765112891891 6605

$\log_{10} \pi =$ 0.49714987269413385435126828829 0899

$\log_{10} \Phi =$ 0.20898764024997873376927208923 7555

$\log_2 e =$ 1.44269504088896340735992468100189

$\log_2 \pi =$ 1.65149612947231879804327929510801

$\log_2 \Phi =$ 0.69424191363061730173879026689 6621

$\ln 2 =$ 0.69314718055994530941723212145 8177

$\log_{10} 2 =$ 0.30102999566398119521373889472 4493

$\log_2 10 =$ 3.32192809488736234787031942948939

$\sqrt{2} =$ 1.41421356237309504880168872420 97

$\sqrt{\pi} =$ 1.77245385090551602729816748334115

$\sqrt{\Phi} =$ 1.27201964951406896425242246173724

BASVALS.WQ1 05/09/90

	radians	deg.	sin(rad)	cos(rad)	tan(rad)
1/pi	0.3183098861838	18.24	0.312961796208	0.949765715382	0.329514733096
1/e	0.3678794411714	21.08	0.359637565412	0.933092075598	0.385425591769
phi	0.6180339887499	35.41	0.579433944458	0.815019204688	0.710945142305
e^(1/e)	1.4446678610098	82.77	0.992056344339	0.125794314885	7.886336876583
Phi	1.6180339887499	92.71	0.998884509095	-0.04722009625	-21.1538007825
e	2.718281828459	155.7	0.410781290503	-0.91173391479	-0.45054953407
pi	3.1415926535898	180	1.22514845E-16	-1	-1.2251485E-16
Feignb	4.6692016091029	267.5	-0.99906757042	-0.04317394739	23.14051947763

		arcsin(B) rad	arccos(B) rad	arctan(B) rad
1/pi	0.3183098861838	0.323946106932	1.246850219863	0.308169071116
1/e	0.3678794411714	0.376727508059	1.194068818736	0.352513421778
phi	0.6180339887499	0.666239432493	0.904556894302	0.553574358897
e^(1/e)	1.4446678610098	ERR	ERR	0.965324042589
Phi	1.6180339887499	ERR	ERR	1.017221967898
e	2.718281828459	ERR	ERR	1.218282905017
pi	3.1415926535898	ERR	ERR	1.262627255679
Feignb	4.6692016091029	ERR	ERR	1.359814225958

		Ln(B)	Log(B)	log2(B)
1/pi	0.3183098861838	-1.14472988585	-0.49714987269	-1.65149612947
1/e	0.3678794411714	-1	-0.4342944819	-1.44269504089
phi	0.6180339887499	-0.48121182506	-0.20898764025	-0.69424191363
e^(1/e)	1.4446678610098	0.367879441171	0.159768011306	0.530737845423
Phi	1.6180339887499	0.48121182506	0.20898764025	0.694241913631
e	2.718281828459	1	0.434294481903	1.442695040889
pi	3.1415926535898	1.144729885849	0.497149872694	1.651496129472
Feignb	4.6692016091029	1.540988095417	0.669242626518	2.223175883327

pi^(1/pi)	1.439619495848
phi^(1/phi)	0.459040384682
Phi^(1/Phi)	1.346360820035
1/F	0.214169377062
F^(1/F)	1.391013280656

SOME VALUES AND THEIR LOGARITHMS

		C VALUE	D LN	E LOG 10	F LOG 2
4	PI	3.1415926535898	1.1447298858494	0.49714987269413	1.651496129**4723**
5	1/PI	0.31830988618379	-1.1447298858494	-0.4971498726941	-1.651496129**4723**
6	SQRT(PI)	1.7724538509055	0.5723649429247	0.24857493634707	0.82574806**473616**
7	1/@SQRT(@PI)	0.56418958354776	-0.5723649429247	-0.2485749363471	-0.825748064**7362**
8	PI^2	9.8696044010894	2.2894597716988	0.99429974538827	3.302992258**9446**
9	1/(PI^2)	0.10132118364234	-2.2894597716988	-0.9942997453883	-3.302992258**9446**
10	2*PI	6.2831853071796	1.8378770664093	0.79817986835812	2.651496129**4723**
11	1/2PI	0.1591549430919	-1.8378770664093	-0.7981798683581	-2.651496129**4723**
12	SQRT(2*PI)	2.506628274631	0.91893853320467	0.39908993417906	1.325748064**7362**
13	1/SQRT(2*PI)	0.39894228040143	-0.9189385332047	-0.3990899341791	-1.325748064**7362**
14	(2*PI)^2	39.478417604357	3.6757541328187	1.5963597367162	5.302992258**9446**
15	1/(2*PI)^2	0.02533029591058	-3.6757541328187	-1.5963597367162	-5.302992258**9446**
16	PI/2	1.5707963267949	0.45158270528945	0.19611987703015	0.6514961294**7232**
17	2/PI	0.63661977236758	-0.4515827052895	-0.1961198770302	-0.651496129**4723**
18	SQRT(PI/2)	1.2533141373155	0.22579135264473	0.09805993851508	0.3257480647**3616**
19	SQRT(2/PI)	0.79788456080287	-0.2257913526447	-0.0980599385151	-0.325748064**7362**
20	(PI/2)^2	2.4674011002723	0.90316541057891	0.39223975406031	1.302992258**9446**
21	(2/PI)^2	0.40528473456935	-0.9031654105789	-0.3922397540603	-1.302992258**9446**
22	4*PI	12.566370614359	2.5310242469693	1.0992098640221	3.651496129**4723**
23	4*PI/3	4.1887902047864	1.4324119583012	0.62208860930243	2.066533628**7512**
24					
25	1	1	0	0	**0**
26	2	2	0.69314718055995	0.30102999566398	**1**
27	3	3	1.0986122886681	0.47712125471966	1.584962500**7212**
28	4	4	1.3862943611199	0.60205999132796	**2**
29	5	5	1.6094379124341	0.69897000433602	2.321928094**8874**
30	6	6	1.7917594692281	0.77815125038364	2.584962500**7212**
31	7	7	1.9459101490553	0.84509804001426	2.807354922**0576**
32	8	8	2.0794415416798	0.90308998699194	**3**
33	9	9	2.1972245773362	0.95424250943932	3.169925001**4423**
34	10	10	2.302585092994	1	3.321928094**8874**
35					
36	e	2.718281828459	1	0.43429448190325	1.44269504088**9**
37	1/e	0.36787944117144	-1	-0.4342944819033	-1.44269504088**9**
38	e^2	7.3890560989307	2	0.8685889638065	2.885390081777**9**
39	1/(e^2)	0.13533528323661	-2	-0.8685889638065	-2.885390081777**9**
40	SQRT(e)	1.6487212707001	0.5	0.21714724095163	0.7213475204444**8**
41	1/SQRT(e)	0.60653065971263	-0.5	-0.2171472409516	-0.721347520444**5**

$\sqrt{\frac{3\pi}{G}}$

4.074988

Seconds in a year of 365.2425 days = 31,556,952

$\log_{10} = 7.499095$

INTE	FIBONACCI	POWERS OF 2	EXPONENTIAL	POWERS OF 10	FACTORIALS	N^N
1	1	2	2.718281828459	10	1	1
2	1	4	7	100	2	4
3	2	8	20	1000	6	27
4	3	16	55	10000	24	256
5	5	32	148	100000	120	3125
6	8	64	403	1000000	720	46656
7	13	128	1097	10000000	5040	823543
8	21	256	2981	100000000	40320	16777216
9	34	512	8103	1000000000	362880	387420489
10	55	1024	22026	10000000000	3628800	10000000000
11	89	2048	59874	100000000000	39916800	285311670611
12	144	4096	162755	1000000000000	479001600	8916100448256
13	233	8192	442413	10000000000000	6227020800	302875106592253
14	377	16384	1202604	1E+14	87178291200	11112006825558020
15	610	32768	3269017	1E+15	1307674368000	4.378938903809E+17
16	987	65536	8886111	1E+16	20922789888000	1.844674407371E+19
17	1597	131072	24154953	1E+17	3.556874281E+14	8.272402618863E+20
18	2584	262144	65659969	1E+18	6.4023737057E+15	3.93464080753E+22
19	4181	524288	178482301	1E+19	1.2164510041E+17	1.97841965566E+24
20	6765	1048576	485165195	1E+20	2.4329020082E+18	1.048576E+26
21	10946	2097152	1318815734	1E+21	5.1090942172E+19	5.842587018386E+27
22	17711	4194304	3584912846	1E+22	1.1240007278E+21	3.414278773642E+29
23	28657	8388608	9744803446	1E+23	2.5852016739E+22	2.088046799985E+31
24	46368	16777216	26489122130	1E+24	6.2044840173E+23	1.33373577685E+33
25	75025	33554432	72004899337	1E+25	1.5511210043E+25	8.881784197001E+34
26	121393	67108864	195729609429	1E+26	4.0329146113E+26	6.156119580207E+36
27	196418	134217728	532048240602	1E+27	1.088886945E+28	4.43426488243E+38
28	317811	268435456	1446257064291	1E+28	3.0488834461E+29	3.314552311325E+40

rounded integer $[e^n]$

growth curve

Make a table of loop of about sequences

Slopes and curvatures as measures of rates of ↑ and as measures of ∞

PERFECT NUMBERS: Σ of Factors = #

6 $1+2+3=6$

28 $1+2+4+7+14=28$

496

8128

See N.B. on Hierarchical Numbers
Power Towers

π and $\hat{\pi}$

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PI = 3.+

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8214808651 3282306647 0938446095 5058223172 5359408128 4811174502 8410270193 8521105559 6446229489 549
4428810975 6659334461 2847564823 3786783165 2712019091 4564856692 3460348610 4543266482 1339360726 024
7245870066 0631558817 4881520920 9628292540 9171536436 7892590360 0113305305 4882046652 1384146951 941
3305727036 5759591953 0921861173 8193261179 3105118548 0744623799 6274956735 1885752724 8912279381 830
9833673362 4406566430 8602139494 6395224737 1907021798 6094370277 0539217176 2931767523 8467481846 766
0005681271 4526356082 7785771342 7577896091 7363717872 1468440901 2249534301 4654958537 1050792279 689
4201995611 2129021960 8640344181 5981362977 4771309960 5187072113 4999999837 2978049951 0597317328 160
5024459455 3469083026 4252230825 3344685035 2619311881 7101000313 7838752886 5875332083 8142061717 766
5982534904 2875546873 1159562863 8823537875 9375195778 1857780532 1712268066 1300192787 6611195909 216

3809525720 1065485863 2788659361 5338182796 8230301952 0353018529 6899577362 2599413891 2497217752 834
5574857242 4541506959 5082953311 6861727855 8890750983 8175463746 4939319255 0604009277 0167113900 984
8583616035 6370766010 4710181942 9555961989 4676783744 9448255379 7747268471 0404753464 6208046684 259
9331367702 8989152104 7521620569 6602405803 8150193511 2533824300 3558764024 7496473263 9141992726 042
6782354781 6360093417 2164121992 4586315030 2861829745 5570674983 8505494588 5869269956 9092721079 750
3211653449 8720275596 0236480665 4991198818 3479775356 6369807426 5425278625 5181841757 4672890977 772
8164706001 6145249192 1732172147 7235014144 1973568548 1613611573 5255213347 5741849468 4385233239 073
4547762416 8625189835 6948556209 9219222184 2725502542 5688767179 0494601653 4668049886 2723279178 608
8279679766 8145410095 3883786360 9506800642 2512520511 7392984896 0841284886 2694560424 1965285022 210
0674427862 2039194945 0471237137 8696095636 4371917287 4677646575 7396241389 0865832645 9958133904 780

9465764078 9512694683 9835259570 9825822620 5224894077 2671947826 8482601476 9909026401 3639443745 530
4962524517 4939965143 1429809190 6592509372 2169646151 5709858387 4105978859 5977297549 8930161753 928
6868386894 2774155991 8559252459 5395943104 9972524680 8459872736 4469584865 3836736222 6260991246 080
4390451244 1365497627 8079771569 1435997700 1296160894 4169486855 5848406353 4220722258 2848864815 845
0168427394 5226746767 8895252138 5225499546 6672782398 6456596116 3548862305 7745649803 5593634568 174
1507606947 9451096596 0940252288 7971089314 5669136867 2287489405 6010150330 8617928680 9208747609 178
9009714909 6759852613 6554978189 3129784821 6829989487 2265880485 7564014270 4775551323 7964145152 374
5428584447 9526586782 1051141354 7357395231 1342716610 2135969536 2314429524 8493718711 0145765403 590
0374200731 0578539062 1983874478 0847848968 3321445713 8687519435 0643021845 3191048481 0053706146 806
8191197939 9520614196 6342875444 0643745123 7181921799 9839101591 9561814675 1426912397 4894090718 649

5679452080 9514655022 5231603881 9301420937 6213785595 6638937787 0830390697 9207734672 2182562599 661
0306803844 7734549202 6054146659 2520149744 2850732518 6660021324 3408819071 0486331734 6496514539 057
1005508106 6587969981 6357473638 4052571459 1028970641 4011097120 6280439039 7595156771 5770042033 786
2305587631 7635942187 3125147120 5329281918 2618612586 7321579198 4148488291 6447060957 5270695722 094
7229109816 9091528017 3506712748 5832228718 3520935396 5725121083 5791513698 8209144421 0067510334 671
6711136990 8658516398 3150197016 5151168517 1437657618 3515565088 4909989859 9823873455 2833163550 764
8932261854 8963213293 3089857064 2046752590 7091548141 6549859461 6371802709 8199430992 4488957571 282
2332609729 9712084433 5732654893 8239119325 9746366730 5836041428 1388303203 8249037589 8524374417 029
1809377344 4030707469 2112019130 2033038019 7621101100 4492932151 6084244485 9637669838 9522868478 313
2131449576 8572624334 4189303968 6426243410 7732269780 2807318915 4411010446 8232527162 0105265227 21

6655730925 4711055785 3763466820 6531098965 2691862056 4769312570 5863566201 8558100729 3606598764 86
3348850346 1136576867 5324944166 8039626579 7877185560 8455296541 2665408530 6143444318 5867697514 566
7002378776 5913440171 2749470420 5622305389 9456131407 1127000407 8547332699 3908145466 4645880797 27
6343285878 5698305235 8089330657 5740679545 7163775254 2021149557 6158140025 0126228594 1302164715 50
0990796547 3761255176 5675135751 7829666454 7791745011 2996148903 0463994713 2962107340 4375189573 59
9389713111 7904297828 5647503203 1986915140 2870808599 0480109412 1472213179 4764777262 2414254854 54
8530614228 8137585043 0633217518 2979866223 7172159160 7716692547 4873898665 4949450114 6540628433 66
9769265672 1463853067 3609657120 9180763832 7166416274 8888007869 2560290228 4721040317 2118608204 19
6171196377 9213375751 1495950156 6049631862 9472654736 4252308177 0367515906 7350235072 8354056704 03
6222247715 8915049530 9844489333 0963408780 7693259939 7805419341 4473774418 4263129860 8099888687 41

other hand, if there should fail to be 100 zeros in the expansion we have computed, we are left no wiser than before; we know nothing about the second billion digits. Even if there is a sequence of 100 zeros in our calculated expansion, we could change the question to 1,000 successive 9's (for example) and still have an open question. The point is that there are now, and always will be, simple

π to 5,000 Dec
From Daniel Sh
John W. Wrenc

Courtesy: Mathemati
tation, Vol. XVI, No.
uary 1962

PI = 3.+

1415926535 8979323846 2643383279 5028841971 6939937510 5820974944 5923078164 0628620899 8628034825 3421170679
8214808651 3282306647 0938446095 5058223172 5359408128 4811174502 8410270193 8521105559 6446229489 5493038196
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7245870066 0631558817 4881520920 9628292540 9171536436 7892590360 0113305305 4882046652 1384146951 9415116094
3305727036 5759591953 0921861173 8193261179 3105118548 0744623799 6274956735 1885752724 8912279381 8301194912
9833673362 4406566430 8602139494 6395224737 1907021798 6094370277 0539217176 2931767523 8467481846 7669405132
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6782354781 6360093417 2164121992 4586315030 2861829745 5570674983 8505494588 5869269956 9092721079 7509302955
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9389713111 7904297828 5647503203 1986915140 2870808599 0480109412 1472213179 4764777262 2414254854 5403321571
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9769265672 1463853067 3609657120 9180763832 7166416274 8888007869 2560290228 4721040317 2118608204 1900042296
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6222247715 8915049530 9844489333 0963408780 7693259939 7805419341 4473774418 4263129860 8099888687 4132604721

π to 5,000 Decimals. From Daniel Shanks and John W. Wrench, Jr.

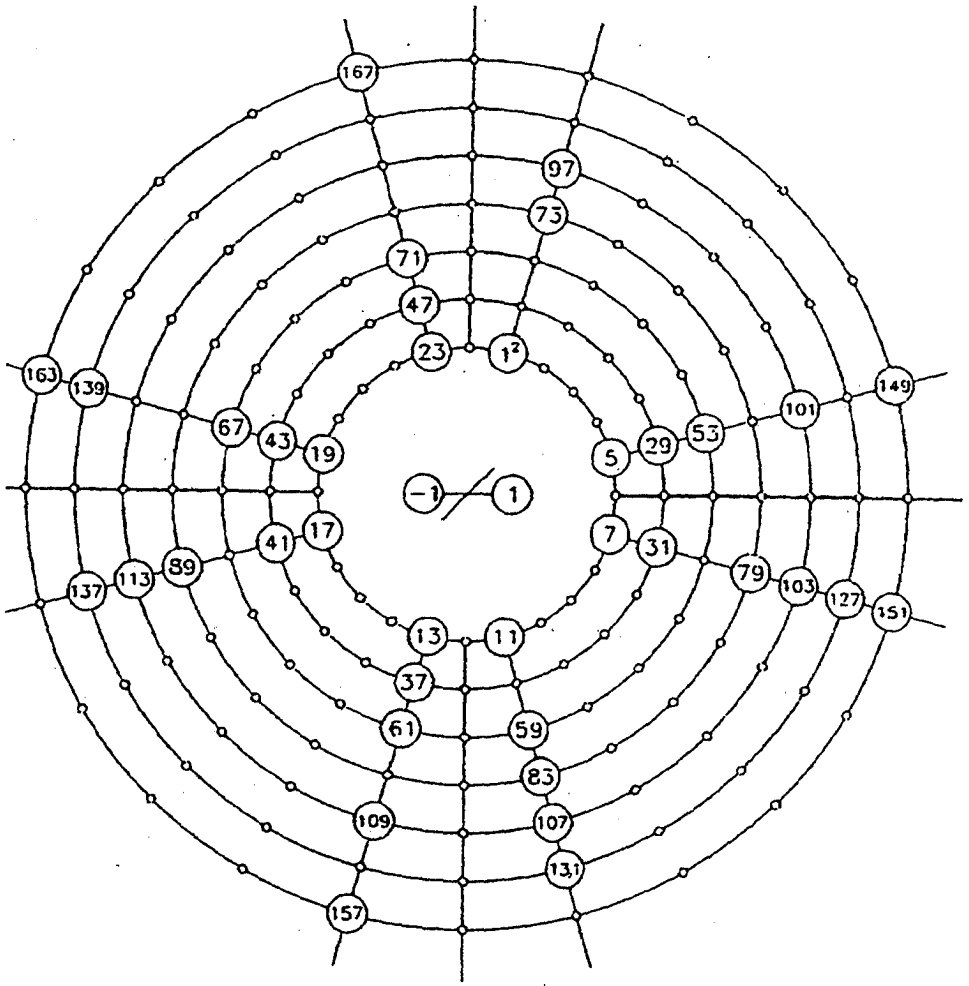
Courtesy: Mathematics of Computation, Vol. XVI, No. 77, January 1962

other hand, if there should fail to be 100 zeros in the expansion we have computed, we are left no wiser than before; we know nothing about the second billion digits. Even if there is a sequence of 100 zeros in our calculated expansion, we could change the question to 1,000 successive 9's (for example) and still have an open question. The point is that there are now, and always will be, simple questions about π of this kind to which we never expect to have an answer.

Let P denote the statement, "In the decimal expansion of π, there eventually occurs a row of 100 successive zeros." Let $\overline{P}$ denote the contrary, "In the decimal expansion of π,

PRIMES

ON PRIME NUMBERS



The above diagram shows geometrically a pattern in the distribution of prime numbers. This pattern was "discovered" by Peter Plichta [see God's Secret Formula, Element Press 1997]. This diagram may be summarized:

All prime numbers, p, (except 1, 2, and 3) can be expressed in the form
$p = (N \times 6) \pm 1$ Where N = 1,2,3,....

Which is to say, If {P} is the set of all primes and {F} is the set of all numbers given by Nx6±1, then, $\{F\} \supset \{P\}$. That is all p are in {F}.

However, traditionally mathematicians have sought for an F such that $\{F\} \equiv \{P\}$, that is all members of the set {F} are prime and there are no members of {F} that are not prime. Plichta'a {F} does not meet this criterion, however it indicates where not to look for primes.

$p_1 \times p_2$ never $= n^2$

$6 \mid (p+1)$ or $6 \mid (p-1)$ } for all p except 1, 2, 3

e.g. $6 \mid (23+1)$

$6 \mid (37-1)$

~~all end in 7 or 9~~

except for 2, 5, all primes end in 1, 3, 7, or 9

ONPRIME2.WP6 MAY 14, 1998

PRIME NUMBERS --CONTINUED APOPHASIS

In scrap 1997#78 (ONPRIMES.WP6) the diagram shows that primes are distributed along eight of twenty four radial lines. Which says that the set of primes {P} has to be less than one third of the set of all natural numbers, {N}.

$$\{P\} < \{N\}/3$$

After 1,2,and 3, there are definitely no primes in sixteen of the twenty four axes.

Is it possible to find further apophatic rules regarding primes? [By apophatic is meant we focus on non-primes rather than primes] To look into this matter we must get into sex, (sexigessimal that is).

In base ten (except for the primes two and five), primes always end in one of the four numbers 1,3,7,or 9. More restrictive endings are found when we convert to other number bases. When we convert to base six, we find that primes always end in either one or five. So in base six if a number does not end in one or five it is definitely not a prime[1].

But what about the numbers that do end in one or five? We know that many of them are not primes. For example the number 355 base six (which is = 143 decimal) is not prime but does end in five. If we take the sum of the digits (= 13 in the example) of numbers ending in five, we find that no prime ever has the sum 5 or 10. Apophatically we may say that numbers ending in five whose digits sum to 5 or 10 are not primes. Again in the case of numbers ending in one, if the sum of the digits is ~~one~~ ten (10) or five the number is definitely not prime[2].

While this rule apophatically increases the number of non-primes it goes only a short distance. More subtle patterns in the distribution of primes or non-primes remain to be detected.

(A preliminary observation: The actual digits of the primes in decimal and base four show remarkable duplications).

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[1]In base four, if a number does not end in either one or three it is definitely not a prime.

[2]A similar result appears to hold for base four. Numbers ending in one or three whose sum is three or six are not primes.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	2	547	1229	1993	2749	3581	4421	5281	6143	7001	7927	8837	9739	10663	11677	12569	13513	14535	15413	16411	17393	18329	19427	20359	21391
2	3	557	1231	1997	2753	3583	4423	5297	6151	7013	7933	8839	9743	10667	11681	12577	13523	14537	15427	16417	17401	18341	19429	20369	21397
3	5	563	1237	1999	2767	3593	4441	5303	6163	7019	7937	8849	9749	10687	11689	12583	13537	14543	15439	16421	17417	18353	19433	20389	21401
4	7	569	1249	2003	2777	3607	4447	5309	6173	7027	7949	8861	9767	10691	11699	12589	13553	14549	15443	16427	17419	18367	19441	20393	21407
5	11	571	1259	2011	2789	3613	4451	5323	6197	7039	7951	8863	9769	10709	11701	12601	13567	14551	15451	16433	17431	18371	19447	20399	21419
6	13	577	1277	2017	2791	3617	4457	5333	6199	7043	7963	8867	9781	10711	11717	12611	13577	14557	15461	16447	17443	18379	19457	20407	21433
7	17	587	1279	2027	2797	3623	4463	5347	6203	7057	7993	8887	9787	10723	11719	12613	13591	14561	15467	16451	17449	18397	19463	20411	21467
8	19	593	1283	2029	2801	3631	4481	5351	6211	7069	8009	8893	9791	10729	11731	12619	13597	14563	15473	16453	17467	18401	19469	20431	21481
9	23	599	1289	2039	2803	3637	4483	5381	6217	7079	8011	8923	9803	10733	11743	12637	13613	14591	15493	16477	17471	18413	19471	20441	21487
10	29	601	1291	2053	2819	3643	4493	5387	6221	7103	8017	8929	9811	10739	11777	12641	13619	14593	15497	16481	17477	18427	19477	20443	21491
11	31	607	1297	2063	2833	3659	4507	5393	6229	7109	8039	8933	9817	10753	11779	12647	13627	14621	15511	16487	17483	18433	19483	20477	21493
12	37	613	1301	2069	2837	3671	4513	5399	6247	7121	8053	8941	9829	10771	11783	12653	13633	14627	15527	16493	17489	18439	19489	20479	21499
13	41	617	1303	2081	2843	3673	4517	5407	6257	7127	8059	8951	9833	10781	11789	12659	13649	14629	15541	16519	17491	18443	19501	20483	21503
14	43	619	1307	2083	2851	3677	4519	5413	6263	7129	8069	8963	9839	10789	11801	12671	13669	14633	15551	16529	17497	18451	19507	20507	21517
15	47	631	1319	2087	2857	3691	4523	5417	6269	7151	8081	8969	9851	10799	11807	12689	13679	14639	15559	16547	17509	18457	19531	20509	21521
16	53	641	1321	2089	2861	3697	4547	5419	6271	7159	8087	8971	9857	10831	11813	12697	13681	14653	15569	16553	17519	18461	19541	20521	21523
17	59	643	1327	2099	2879	3701	4549	5431	6277	7177	8089	8999	9859	10837	11821	12703	13687	14657	15581	16561	17539	18481	19543	20533	21529
18	61	647	1361	2111	2887	3709	4561	5437	6287	7187	8093	9001	9871	10847	11827	12713	13691	14669	15583	16567	17551	18493	19553	20543	21557
19	67	653	1367	2113	2897	3719	4567	5441	6299	7193	8101	9007	9883	10853	11831	12721	13693	14683	15601	16573	17569	18503	19559	20549	21559
20	71	659	1373	2129	2903	3727	4583	5443	6301	7207	8111	9011	9887	10859	11833	12739	13697	14699	15607	16603	17573	18517	19571	20551	21563
21	73	661	1381	2131	2909	3733	4591	5449	6311	7211	8117	9013	9901	10861	11839	12743	13709	14713	15619	16607	17579	18521	19577	20563	21569
22	79	673	1399	2137	2917	3739	4597	5471	6317	7213	8123	9029	9907	10867	11863	12757	13711	14717	15629	16619	17581	18523	19583	20593	21577
23	83	677	1409	2141	2927	3761	4603	5477	6323	7219	8147	9041	9923	10885	11867	12763	13721	14723	15641	16631	17597	18539	19597	20599	21587
24	89	683	1423	2143	2939	3767	4621	5479	6329	7229	8161	9043	9929	10889	11887	12781	13723	14731	15643	16633	17599	18541	19603	20611	21589
25	97	691	1427	2153	2953	3769	4637	5483	6337	7237	8167	9049	9931	10891	11897	12791	13729	14737	15647	16649	17609	18553	19609	20627	21599
26	101	701	1429	2161	2957	3779	4639	5501	6343	7243	8171	9059	9941	10903	11903	12799	13751	14741	15649	16651	17623	18583	19661	20639	21601
27	103	709	1433	2179	2963	3793	4643	5503	6353	7247	8179	9067	9949	10909	11909	12809	13757	14747	15661	16657	17627	18587	19681	20641	21611
28	107	719	1439	2203	2969	3797	4649	5507	6359	7253	8191	9091	9967	10937	11923	12821	13759	14753	15667	16661	17657	18593	19687	20663	21613
29	109	727	1447	2207	2971	3803	4651	5519	6361	7283	8209	9103	9973	10939	11927	12823	13763	14759	15671	16673	17659	18617	19697	20681	21617
30	113	733	1451	2213	2999	3821	4657	5521	6367	7297	8219	9109	10007	10949	11933	12829	13781	14767	15679	16691	17669	18637	19699	20693	21647
31	127	739	1453	2221	3001	3823	4663	5527	6373	7307	8221	9127	10009	10957	11939	12841	13789	14771	15683	16693	17681	18661	19709	20707	21649
32	131	743	1459	2237	3011	3833	4673	5531	6379	7309	8231	9133	10037	10973	11941	12853	13799	14779	15727	16699	17683	18671	19717	20717	21661
33	137	751	1471	2239	3019	3847	4679	5557	6389	7321	8233	9137	10039	10979	11953	12889	13807	14783	15731	16703	17707	18679	19727	20719	21673
34	139	757	1481	2243	3023	3851	4691	5563	6397	7331	8237	9151	10061	10987	11959	12893	13829	14797	15733	16729	17713	18691	19739	20731	21683
35	149	761	1483	2251	3037	3853	4703	5569	6421	7333	8243	9157	10067	10993	11969	12899	13831	14813	15737	16741	17729	18701	19751	20743	21701
36	151	769	1487	2267	3041	3863	4721	5573	6427	7349	8263	9161	10069	11003	11971	12907	13841	14821	15739	16747	17737	18713	19753	20747	21713
37	157	773	1489	2269	3049	3877	4723	5581	6449	7351	8269	9173	10079	11027	11981	12911	13859	14827	15749	16759	17747	18719	19759	20749	21727
38	163	787	1493	2273	3061	3881	4729	5591	6451	7369	8273	9181	10091	11047	11987	12917	13873	14831	15761	16763	17749	18731	19763	20753	21737
39	167	797	1499	2281	3067	3889	4733	5623	6469	7393	8287	9187	10093	11057	12007	12919	13877	14843	15767	16787	17761	18743	19777	20759	21739
40	173	809	1511	2287	3079	3907	4751	5639	6473	7411	8291	9199	10099	11059	12011	12923	13879	14851	15773	16811	17783	18749	19793	20771	21751
41	179	811	1523	2293	3083	3911	4759	5641	6481	7417	8293	9203	10103	11069	12037	12941	13883	14867	15787	16823	17789	18757	19801	20773	21757
42	181	821	1531	2297	3089	3917	4783	5647	6491	7433	8297	9209	10111	11071	12041	12953	13901	14869	15791	16829	17791	18773	19813	20789	21767
43	191	823	1543	2309	3109	3919	4787	5651	6521	7451	8311	9221	10133	11083	12043	12959	13903	14879	15797	16831	17807	18787	19819	20807	21773
44	193	827	1549	2311	3119	3923	4789	5653	6529	7457	8317	9227	10139	11087	12049	12967	13907	14887	15803	16843	17827	18793	19841	20809	21787
45	197	829	1553	2333	3121	3929	4793	5657	6547	7459	8329	9239	10141	11093	12071	12973	13913	14891	15809	16871	17837	18797	19843	20849	21799
46	199	839	1559	2339	3137	3931	4799	5659	6551	7477	8353	9241	10151	11113	12073	12979	13921	14897	15817	16879	17839	18803	19853	20857	21803
47	211	853	1567	2341	3163	3943	4801	5669	6553	7481	8363	9257	10159	11117	12097	12983	13931	14923	15823	16883	17851	18839	19861	20873	21817
48	223	857	1571	2347	3167	3947	4813	5683	6563	7487	8369	9277	10163	11119	12101	13001	13933	14929	15859	16889	17863	18859	19867	20879	21821
49	227	859	1579	2351	3169	3967	4817	5689	6569	7489	8377	9281	10169	11131	12107	13003	13963	14939	15877	16901	17881	18869	19889	20887	21839
50	229	863	1583	2357	3181	3989	4831	5693	6571	7499	8387	9283	10177	11149	12109	13007	13967	14947	15881	16903	17891	18899	19891	20897	21841
51	233	877	1597	2371	3187	4001	4861	5701	6577	7507	8389	9293	10181	11159	12113	13009	13997	14951	15887	16921	17903	18911	19913	20899	21851
52	239	881	1601	2377	3191	4003	4871	5711	6581	7517	8419	9311	10193	11161	12119	13033	13999	14957	15889	16927	17909	18913	19919	20903	21859
53	241	883	1607	2381	3203	4007	4877	5717	6599	7523	8423	9319	10211	11171	12143	13037	14009	14969	15901	16931	17911	18917	19927	20921	21863
54	251	887	1609	2383	3209	4013	4889	5737	6607	7529	8429	9323	10223	11173	12149	13043	14011	14983	15907	16937	17921	18919	19937	20929	21871
55	257	907	1613	2389	3217	4019	4903	5741	6619	7537	8431	9337	10243	11177	12157	13049	14029	15013	15913	16943	17923	18947	19949	20939	21881
56	263	911	1619	2393	3221	4021	4909	5743	6637	7541	8443	9341	10247	11197	12161	13063	14033	15017	15919	16963	17929	18959	19961	20947	21893
57	269	919	1621	2399	3229	4027	4919	5749	6653	7547	8447	9343	10253	11213	12163	13093	14051	15031	15923	16979	17939	18973	19963	20959	21911
58	271	929	1627	2411	3251	4049	4931	5779	6659	7549	8461	9349	10259	11239	12197	13099	14057	15053	15937	16981	17957	18979	19973	20963	21929
59	277	937	1637	2417	3253	4051	4933	5783	6661	7559	8467	9371	10267	11243	12203	13103	14071	15061	15959	16987	17959	19001	19979	20981	21937
60	281	941	1657	2423	3257	4057	4937	5791	6673	7561	8501	9377	10271	11251	12211	13109	14081	15073	15971	16993	17971	19009	19991	20983	21943
61	283	947	1663	2437	3259	4073	4943	5801	6679	7573	8513	9391	10273	11257	12227	13121	14083	15077	15973	17011	17977	19013	19993	21001	21961
62	293	953	1667	2441	3271	4079	4951	5807	6689	7577	8521	9397	10289	11261	12239	13127	14087	15083	15991	17021	17981	19031	19997	21011	21977
63	307	967	1669	2447	3299	4091	4957	5813	6691	7583	8527	9403	10301	11273	12241	13147	14107	15091	16001	17027	17987	19037	20011	21013	21991
64	311	971	1693	2459	3301	4093	4967	5821	6701	7589	8537	9413	10303	11279	12251	13151	14143	15101	16007	17029	17989	19051	20021	21017	21997
65	313	977	1697	2467	3307	4099	4969	5827	6703	7591	8539	9419	10313	11287	12253	13159	14149	15107	16033	17033	18013	19069	20023	21019	22003
66	317	983	1699	2473	3313	4111	4973	5839	6709	7603	8543	9421	10321	11299	12263	13163	14159	15121	16057	17041	18041	19073	20029	21023	22013
67	331	991	1709	2477	3319	4127	4987	5843	6719	7607	8563	9431	10331	11311	12269	13171	14159	15131	16061	17047	18043	19079	20047	21031	22027
68	337	997	1721	2503	3323	4129	4993	5849	6733	7621	8573	9433	10333	11317	12277	13177	14173	15137	16063	17053	18047	19081	20051	21059	22031
69	347	1009	1723	2521	3329	4133	4999	5851	6737	7639	8581	9437	10337	11321	12281	13183	14177	15139	16067	17077	18049	19087	20063	21061	22037
70	349	1013	1733	2531	3331	4139	5003	5857	6761	7643	8597	9439	10343	11329	12289	13187	14197	15149	16069	17093	18059	19121	20071	21067	22039
71	353	1019	1741	2539	3343	4153	5009	5861	6763	7649	8599	9461	10357	11351	12301	13217	14207	15161	16073	17099	18061	19139	20089	21089	22051
72	359	1021	1747	2543	3347	4157	5011	5867	6779	7669	8609	9463	10369	11353	12323	13219	14221	15173	16087	17107	18077	19141	20101	21101	22063
73	367	1031	1753	2549	3359	4159	5021	5869	6781	7673	8623	9467	10391	11369	12329	13229	14243	15187	16091	17117	18089	19157	20107	21107	22067
74	373	1033	1759	2551	3361	4177	5023	5879	6791	7681	8627	9473	10399	11383	12343	13241	14249	15193	16097	17123	18097	19163	20113	21121	22073
75	379	1039	1777	2557	3371	4201	5039	5881	6793	7687	8629	9479	10427	11393	12347	13249	14251	15199	16103	17137	18119	19181	20117	21139	22079
76	383	1049	1783	2579	3373	4211	5051	5897	6803	7691	8641	9491	10429	11399	12373	13259	14281	15217	16111	17159	18121	19183	20123	21143	22091
77	389	1051	1787	2591	3389	4217	5059	5903	6823	7699	8647	9497	10433	11411	12377	13267	14293	15227	16127	17167	18127	19207	20129	21149	22093
78	397	1061	1789	2593	3391	4219	5077	5923	6827	7703	8663	9511	10453	11425	12379	13291	14303	15233	16139	17183	18131	19211	20143	21157	22109
79	401	1063	1801	2609	3407	4229	5081	5927	6829	7717	8669	9521	10457	11437	12391	13297	14321	15241	16141	17189	18133	19213	20147	21163	22111
80	409	1069	1811	2617	3413	4231	5087	5939	6833	7723	8677	9533	10459	11443	12401	13309	14323	15259	16183	17191	18143	19219	20149	21169	22123
81	419	1087	1823	2621	3433	4241	5099	5953	6841	7727	8681	9539	10463	11447	12409	13313	14327	15263	16187	17203	18149	19231	20161	21179	22129
82	421	1091	1831	2633	3449	4243	5101	5981	6857	7741	8689	9547	10477	11467	12413	13327	14341	15269	16189	17207	18169	19237	20173	21187	22133
83	431	1093	1847	2647	3457	4253	5107	5987	6863	7753	8693	9551	10487	11471	12421	13331	14347	15271	16193	17209	18181	19249	20177	21191	22147
84	433	1097	1861	2657	3461	4259	5113	6007	6869	7757	8699	9587	10499	11483	12433	13337	14369	15277	16217	17231	18191	19259	20183	21193	22153
85	439	1103	1867	2659	3463	4261	5119	6011	6871	7759	8707	9601	10501	11489	12437	13359	14387	15287	16223	17239	18199	19267	20201	21211	22157
86	443	1109	1871	2663	3467	4271	5147	6029	6883	7789	8713	9613	10513	11491	12451	13367	14389	15289	16229	17257	18211	19273	20219	21221	22159
87	449	1111	1873	2671	3469	4273	5153	6037	6899	7793	8719	9619	10529	11497	12457	13381	14401	15299	16231	17291	18217	19289	20231	21227	22171
88	457	1123	1877	2677	3491	4283	5167	6043	6907	7817	8731	9623	10531	11503	12473	13397	14407	15307	16249	17293	18223	19301	20233	21247	22189
89	461	1129	1879	2683	3499	4289	5171	6047	6911	7823	8737	9629	10559	11519	12479	13399	14411	15313	16253	17299	18229	19309	20249	21269	22193
90	463	1151	1889	2687	3511	4297	5179	6053	6917	7829	8741	9631	10567	11527	12487	13411	14419	15319	16267	17317	18233	19319	20261	21277	22229
91	467	1153	1901	2689	3517	4327	5189	6067	6947	7841	8747	9643	10589	11549	12491	13417	14423	15329	16273	17321	18251	19333	20269	21283	22247
92	479	1163	1907	2693	3527	4337	5197	6073	6949	7853	8753	9649	10597	11551	12497	13421	14431	15331	16301	17327	18253	19373	20287	21313	22259
93	487	1171	1913	2699	3529	4339	5209	6079	6959	7867	8761	9661	10601	11579	12503	13441	14437	15349	16319	17333	18257	19379	20297	21317	22271
94	491	1181	1931	2707	3533	4349	5227	6089	6961	7873	8779	9677	10607	11567	12511	13451	14447	15359	16333	17341	18269	19381	20323	21319	22273
95	499	1187	1933	2711	3539	4357	5231	6091	6967	7877	8783	9679	10613	11593	12517	13457	14449	15361	16339	17351	18287	19387	20327	21323	22277
96	503	1193	1949	2713	3541	4363	5233	6101	6971	7879	8803	9689	10627	11597	12527	13463	14461	15373	16349	17359	18289	19391	20333	21341	22279
97	509	1201	1951	2719	3547	4373	5237	6113	6977	7883	8807	9697	10631	11617	12539	13469	14479	15377	16361	17377	18301	19403	20341	21347	22283
98	521	1213	1973	2729	3557	4391	5261	6121	6983	7901	8819	9719	10639	11621	12541	13477	14489	15383	16363	17383	18307	19417	20347	21377	22291
99	523	1217	1979	2731	3559	4397	5273	6131	6991	7907	8821	9721	10651	11633	12547	13487	14503	15391	16369	17387	18313	19421	20359	21379	22303
100	541	1223	1987	2741	3571	4409	5279	6133	6997	7919	8831	9733	10657	11657	12553	13499	14519	15401	16381	17389	18313	19423	20357	21383	22307

Table of the First 2500 Prime Numbers

From D. N. Lehmer, List of prime numbers from 1 to 10,006,721, Carnegie Institution of Washington. Publication No. 165, Washington, D.C., 1914.

Mersenne Primes

$2^M - 1$

largest (2003)

$2^{20,966,011} - 1$ 6,320,430 digits

NUMAPROX.WPD

1.324717957...
The Plastic Number
Or
Silver Number
Richard Padovan
$P_{i+3} = P_i + P_{i+1}$

SOME APPROXIMATIONS

values:

$\sqrt{2}$ = 1.41421356237309504880168872420969

π = 3.14159265358979323846264338327950

e = 2.71828182845904523536028747135266

Φ = 1.61803398874989484820458683436564 = the golden section

Golden Number
$\varphi_{i+2} = \varphi_i + \varphi_{i+1}$
φ for Phidias

γ = 0.5772156649 = Euler's constant

δ = 4.6692016091029 = Feigenbaum's constant

New Constant = 1.13198824...

$\log \delta$ = 0.66924262651820317917383358337518 8

$\delta - \log \delta$ = 3.99995898258469682082616641662481 ≐ 4.0000

$e\Phi/\pi$ = 1.40001358369048485629861350299979 ≐ 7/5

$5e/7\pi$ = 0.61803998530876077658412484974720 7 ≐ $\varphi = \Phi - 1$

$\sqrt[11]{199}$ = 1.61803027449371786505215835713453 ≐ Φ

$\pi/4$ = 0.78539816339744830961566084581987 6 ≐ $1/\sqrt{\Phi}$
$1/\sqrt{\Phi}$ = 0.78615137775742328606955858584295 9 ≐ $\pi/4$

5π = 15.70796326794896619231321691639750 ≐ $6\Phi^2$
$6\Phi^2$ = 15.70820393249936908922752100619380 ≐ 5π

$\sqrt[3]{31}$ = 3.14138065239139300449307589646275 ≐ π

---

67 42Φ = 67.95742755
5^2 $25e$ = 67.95704570

$\sqrt[4]{25e}$ = 2.871168

A new fundamental Number

See Sci Am Aug 99 p 90

$$\frac{466}{885} = \frac{2 \times 233}{5 \times 177} = \frac{2 \times 233}{3 \times 5 \times 59} = 0.5265537$$

Is this a fractal dimension?

$$\log_{10}(\alpha\mu)^{3/4} = 0.845306$$
$$\log_{10}(7) = 0.845098$$
$$\tfrac{4}{3}\log 7 = 1.1267974$$

1998 #40

NUMAPROX.WPD

NUMA PROX 1998 #40
NUMA PRX 2 2004 #39
NUMA PRX 3 2004 #40
NUMA PRX 4 2004 #57

SOME APPROXIMATIONS

values:

$\sqrt{2} = 1.41421356237309504880168872420 97$

$\pi = 3.14159265358979323846264338327 95$

$e = 2.71828182845904523536028747135266$

$\Phi = 1.61803398874989484820458683436564$ = the golden section

$\gamma = 0.5772156649$ = Euler's constant

$\delta = 4.6692016091029$ = Feigenbaum's constant

$\log \delta = 0.66924262651820317917383358337 5188$

$\delta - \log \delta = 3.99995898258469682082616641662481 \doteq 4.0000$

$e\Phi/\pi = 1.40001358369048485629861350299979 \doteq 7/5$

$5e/7\pi = 0.61803998530876077658412484974 7207 \doteq \varphi = \Phi - 1 = 1/\Phi$

$199^{1/11} = 1.61803027449371786505215835713453 \doteq \Phi$

$\pi/4 = 0.78539816339744830961566084581 9876 \doteq 1/\sqrt{\Phi}$
$1/\sqrt{\Phi} = 0.78615137775742328606955858584 2959 \doteq \pi/4$

$5\pi = 15.70796326794896619231321691639 75 \doteq 6\Phi^2$
$6\Phi^2 = 15.70820393249936908922752100619 38 \doteq 5\pi$

$\sqrt[3]{31} = 3.14138065239139300449307589646275 \doteq \pi$

References:

δ = Feigenbaum's Constant

4.669 201 609 102 9...

γ = Euler's Constant

0.577 21 56649 ...

The Mathematical Tourist p 153

The World within the World p 282

Mathematics of the Unexpected p 137

Fractal Programming in C p 18

Life Time Computers

The Puzzle Master p 35

Allen Astrophysical Quantities p 13

Part I 1998 #40

NUMAPRX2.WPD June 2, 2004

SOME NUMERICAL APPROXIMATIONS II

Measured values: $\alpha = 0.007297353$, $1/\alpha = 137.0359895$

$\log_{10} S^{-1} = Gm_e m_p/\alpha c\hbar = 39.355882$

where		Cgs $\log_{10}$
G	= 6.67259	-7.175706
m_e	= 9.1093897	-27.04051072
m_p	= 1.6726231	-23.77660191
$\hbar$	= 1.05457266	-26.97692349
α	= 0.00729735	-2.13683465
c	= 299 792 458	10.47682070

$\alpha^{-1} = 137.035\ 965$

$m_p/m_e = 1836.152756$, $6\pi^5 = 1836.118109$, $\delta = 0.034647$, $Q = 1.0000189$

The following approximations or "coincidences" from P.L. Kannappan:

Define $\omega = \pi^4 \ln 4 = 135.0376736$, $\omega + 2 = 137.0376736$, $\delta = 0.001684$, $Q = 1.0000118$

$\alpha = 1/(\omega + 2) = 0.007297263$ $\delta = 0.00000009$, $Q = 1.0000123$

$S = 2^{\omega} / 2\pi^2 = 2.264960107 \times 10^{39}$, $\text{Log } S = 39.355060557$, $\delta = 0.000821$, $Q = 1.0000208$

$\Phi = 1.6180339887$, $2 - 1.2/\pi = 1.618028$, $\delta = 0.000006$

---

from NUMAPROX.WPD 1998 # 40 $e = 2.718281828$

$e\,\Phi/\pi \approx 7/5$, $\Phi^{-1/2} \approx \pi/4$,

eliminating Φ, $e = 7\pi^3/80 = 2.71305$

Eliminating π, $e = \Phi^{-3/2}\,28/5 = 2.70862$

$10^5 / 9^3 = 137.1742$ $Q = 1.001009$

$\sqrt{51} = 7.1414284$, $\sqrt{2} = 1.4142136$, $10(\sqrt{51} - 7) - \sqrt{2} = 0.000070$ $Q = 1.0000495$

$\log_{10}(\pi\mu)^{3/4} = 0.845306$ $\log_{10} 7 = 0.845098 \Rightarrow \log \mu = 1.1267973$

$\delta = 0.000208$ $Q = 1.0002461$

$6\pi^5 = 1836.12$

$\mu = 1836.1535$

NUMAPRX4.WPD September 2, 2004

SOME NUMERICAL APPROXIMATIONS IV

$\phi^{1/4} = 1.1278385$

$\sqrt{\phi} = 1.2720197$ } in $\alpha+\beta\gamma$

$\frac{4}{\pi} = 1.2732396$

$\sqrt{\frac{4}{\pi}} = 1.1283792$

RECURSION FORMULA: $An_{+2} = 10\,A_{n+1} - 10\,A_n$

CHARACTERISTIC POLYNOMIAL: $r^2 - 10\,r + 10 = 0$

The two roots are: $u = 5 - \sqrt{15} = 1.1270166...$ $u^2 = 1.270166...$
$v = 5 + \sqrt{15} = 8.8729833...$ $v^2 = 78.729833$

$v^2 + u = 40.491934$

$v^2/2 = 39.364917$

$\alpha\mu S = 40.482956$

$\therefore \delta = 0.008978$

MEASURED VALUES: $\log_{10}(\alpha\mu) = 1.127074$, $\log_{10} S = 39.355882$

$[\log_{10}(\alpha\mu)]^2 = 1.2702958$

$\log_{10}(\alpha\mu) - u = 0.000057$ $Q = 1.000051$ 78.71764 $Q = 1.0002218$

$v^2/2 - \log_{10} S = 0.009035$ $Q = 1.000230$ $[\log_{10}(\alpha\mu)]^2 - u^2 = 0.000130$

EXPLICIT FORMULA: (see RECEXP9.MCD DESACH)

Try other bases and logs

$A_n = (p^n - q^n)/(p-q)$

where $p = 5+\sqrt{15}$, $q = 5 - \sqrt{15}$ and $p - q = \sqrt{60}$

$v^2/10 = 7.872983$ $(\log_{10} S)/5 = 7.871176$

$\delta = 0.001807$ $Q = 1.000230$

$u + v^2/10 = 9$ $\log_{10}(\alpha\mu) + (\log_{10} S)/5 = 8.998250$

$\delta = 0.001750$ $Q = 1.000194$

$v - u = \sqrt{60}$	$v + u = 10$	$v\,u = 10$
$v^2 - u^2 = 10\sqrt{60}$ $(v-u)^2 = 60$	$v^2 + u^2 = 80$ $(v+u)^2 = 100$	$v^2\,u^2 = 100$
$v^3 - u^3 = 90\sqrt{60}$	$v^3 + u^3 = 700$	$v^3\,u^3 = 1000$

sequence 0, 1, 10, 90, 800, 7100,....x$\sqrt{60}$ sequence 1, 2, 10, 80, 700, 6200, ...

$An_{+2} = 10\,A_{n+1} - 10\,A_n$ [0,1] $An_{+2} = 10\,A_{n+1} - 10\,A_n$ [1,2] ~~[2, 10]~~ {difference x 10}

$(v+u)^n = (v \cdot u)^n = 10^n$

RATIOS AND RECIPROCALS

1/9 = 0.11111111111111111111.....

11/99 = 0.11111111111111111111.....

10/9 = 1.11111111111111111111.....

19/9 = 2.11111111111111111111.....

1/99 = 0.010101010101010101010.....

10/99 = 0.10101010101010101010.....

1/999 = 0.001001001001001001001.....

1/9999 = 0.000100010001000100010.....

4/33 = 0.121212121212121212121.....

4/333 = 0.012012012012012012012....

2/9 = 0.222222222222222222222.....

11/9 = 1.222222222222222222222.....

20/9 = 2.222222222222222222222.....

29/9 = 3.222222222222222222222.....

2/99 = 0.020202020202020202020.....

3/9 = 0.333333333333333333333.....

21/9 = 2.333333333333333333333.....

3/99 = 0.030303030303030303030...

4/9 = 0.444444444444444444444.....

9/9 = 0.999999999999999999999...

1/11 = 0.090909090909090909090....

POWERS OF 11

$11^0 = 1$
$11^1 = 11$
$11^2 = 121$
$11^3 = 1331$
$11^4 = 14641$
$11^5 = 161051$

BINOMIALS

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
1 10 45 120 210 252 210 120 45 10 1

SQUARES OF ONES

$1^2 = 1$
$11^2 = 121$
$111^2 = 12321$
$1111^2 = 1234321$
$11111^2 = 123454321$
$111111^2 = 12345654321$
$1111111^2 = 1234567654321$
$11111111^2 = 123456787654321$
$111111111^2 = 12345678987654321$
$1111111111^2 = 1234567890098765432 1$

$11111111111^2 = 123456790120987654321$
$111111111111^2 = 1234567901232098765432 1$

11

$11^2 = 121$

$11^3 = 1331$

$11^4 = 14641$

$11^5 = 161051$

$1^2 = 1$

$11^2 = 121$

$111^2 = 12321$

$1111^2 = 1234321$

$11111^2 = 123454321$

$111111^2 = 12345654321$

$1111111^2 = 1234567654321$

$11111111^2 = 123456787654321$

$111111111^2 = 12345678987654321$

$1111111111^2 = 1234567890987654321$

$11111111111^2 = 123456790120987654321$

$111111111111^2 = 1234567901232098765432 1$

~~See Pyramid Books~~ ~~MORE APPROXIMATIONS~~ 666 = DCLXVI

OCCULT NUMBERS

666 = DCLXVI

108 = $1^1 \cdot 2^2 \cdot 3^3$

666 = $2^1 3^2 + 2^3 3^4$

• = Square

		$f \times 9$	Σ digits
•	1	9	9
	2	18	9
	3	27	9
•	4	36	9
	5	45	9
	6	54	9
	7	63	9
	8	72	9
•	9	81	9
	10	90	9
	11	99	9
	12	108	9
	13	117	9
	14	126	9
	15	135	9
•	16	144	9
	17	153	9

$\frac{1}{18}$	6	6		
$\frac{1}{12}$	9	9		
$\frac{1}{9}$	12	3		
$\frac{1}{6}$	18	9		
$\frac{1}{4}$	27	9		
$\frac{1}{3}$	36	9	4	
$\frac{1}{2}$	54	9		
1	108	9	1	A Fulcrum
$6^3 =$ 2	216	9		
3	324	9	4	
4	432	9		
5	540	9		
6	648	18		
7	756	18		
8	864	18		
9	972	18		
10	1080	9		

$\sum_{1}^{6\times6} n = 666$

$\frac{36 \cdot 37}{2} = 666 = \frac{36^2+36}{2} = \frac{37^2-37}{2}$

but $a^2 + a = (a+1)^2 - (a+1)$ for all a

18 81 9 6 4 8 1 9

666 = SUM of the first 36 integers = $\frac{36 \cdot 37}{2}$

666 = Sum of the squares of the first seven prime numbers

$666 = 2^2 + 3^2 + 5^2 + 7^2 + 11^2 + 13^2 + 17^2$

$(2 \cdot 3^2) + 2 \cdot (2 \cdot 3^2)^2 = 666$

$\frac{1}{2}(37^2 - 37) = 666$ (1369)

$a_1 = 2 \cdot 3^2$

$18 \cdot (2 \cdot 18 - 1) = 666$, $2^1 3^2 + 2^3 3^4 = 666$

$a_2 = a_1 + 2 a_1^2$

$18 + 2 \cdot 18^2 = 18(1 + 2 \cdot 18) = 18 \cdot 37 = 666$

Primes

37	3
101	11
271	41

$41 \cdot (271) = 11111$

$82 \cdot 271 = 22222$

$369 \cdot 271 = 99999$

$11 \times (101) = 1111$	
22	2222
33	3333
99	9999

$9 \cdot 37 = 333$

$6 \cdot 37 = 222$

$3 \cdot 37 = 111$

$12 \cdot 37 = 444$

$15 \cdot 37 = 555$

$18 \cdot 37 = 666$

$21 \cdot 37 = 777$

$24 \cdot 37 = 888$

$27 \cdot 37 = 999$

$234 = 2 \cdot 3^2 \cdot 13 = 3^2 \cdot 26$

$243 = 3^5 = 3^2 \cdot 27$

$324 = 2^2 \cdot 3^4 = 3^2 \cdot 36 = 3 \times 108$

$342 = 2 \cdot 3^2 \cdot 19 = 3^2 \cdot 38$

$423 = 3^2 \cdot 47 = 3^2 \cdot 47$

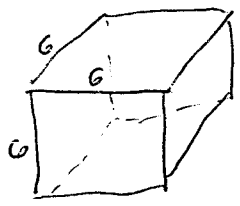
$432 = 2^4 \cdot 3^3 = 3^2 \cdot 48 = 4 \times 108$

Δ's

$47-27=20$

$36-26=10$

$48-38=10$



$6^3 = 216$

$\div 2 = 108$

$$a_n = a_{n-1}\left[\underbrace{\frac{1-(-1)^n}{2}}_{\text{cyclical component}} + \underbrace{2a_{n-1}}_{\text{recurrence component}}\right], \quad a_0 = 1$$

$$b_n = b_{n-1}[\,0 + 2b_{n-1}], \quad b_0 = 1$$

$$c_n = c_{n-1}[\,1 + 2c_{n-1}], \quad c_0 = 1$$

a

$a_0 = 1$

$a_1 = 3$

$a_2 = 2 \cdot 3^2 = 18$

$a_3 = 2 \cdot 3^2 \cdot 37 = 666$

$a_4 = 2^3 3^4 \cdot 37^2 = 887,112$

b

$b_0 = 1 = 2^0$

$b_1 = 2 = 2^1$

$b_2 = 8 = 2^3$

$b_3 = 128 = 2^7$

$b_4 = 32768 = 2^{15}$

c

$c_0 = 1$

$c_1 = 3$

$c_2 = 21$

$c_3 = 903 = 3 \cdot 7 \cdot 43$

$c_4 = 1,631,721$

$= 3 \cdot 7 \cdot 13 \cdot 43 \cdot 139$

$2 \cdot 4 \cdot 37 = 666$

$3 \cdot 7 \cdot 43 = 903$

$5 \cdot 16 \cdot 80$

$80 \cdot 80$

6400

$1569 = 3 \cdot 523$

903
666
237

$43 - 37 = 6$

$43 + 37 = 80$

$37 \cdot 43 = 1591$

$\frac{43}{37} = 1.\overline{162}$

GEMATRIA

VICARIVS FILII DEI

V 5
1 1
c 100
1 1
V 5
112

1 1
L 50
1 1
1 1
53

D 500
1 1
501

112
53
501
666

AUDIO OPERATIONS

PLAY:

TO ALTEC SPEAKERS	SETTING	INVOLVED
[A] AM AND FM RADIO (1)	TUNER	YAMAHA RECEIVER
[B] PHONO (5) ⇒ (1)	PHONO	SANYO
[C] CD's (2) ⇒ (1) singles	TAPE1/MD	DENON
[D] CD's (3) ⇒ (1) cartridges	CD	JVC
[E] AUDIO TAPES (4) ⇒ (1)	AUX	YAMAHA TAPE

RECORD:	LINE IN	LINE OUT
{a} TAPE TO TAPE (4) ⇒ (4)	DUBBING	AUX
{b} AM, FM TO TAPE (1) ⇒ (4)		
{c} PHONO TO TAPE (5) ⇒ (4)		
{d} CD TO TAPE (2) ⇒ (4)		

{e} CD TO CD (2) ⇒ (2)

{f} AM, FM TO CD (1) ⇒ (2)

{g} PHONO TO CD (5) ⇒ (2)

{h} TAPE TO CD (4) ⇒ (2)

NUMBEAST.WP6 APRIL 17, 1998

THE NUMBER OF THE BEAST

Here is Wisdom. Let him that hath understanding count the number of the beast; for it is the number of a man; and his number is Six hundred threescore and six. Rev 13:18 (KJV)
This calls for wisdom. If anyone has insight, let him calculate the number of the beast, for it is man's number. His number is 666. Rev 13:18 (NIV)

For many people the number 666 contains an important secret regarding human destiny. While the mystique surrounding this number goes back more than two millennia, when it appeared in apocalyptic prophecies, today it is still felt by some to hold the key to ominous events yet to come. There have been many interpretations given to the Beast and its symbol. The number has been assigned not only to history's most unsavory characters from Attila to Hitler, but to institutions and peoples ranging from the Papacy to the Communist Kremlin. It has been quite useful to those who would project evil onto their adversaries.

But from a purely arithmetic point of view, is there anything special about the number 666? It can be factored into 2x3x3x37, and the sum of the factors is 45. Nothing particularly special about any of this. But we must remember that the number system used when 666 was endowed with special attributes was the Roman system which used I for one, V for five, X for ten, L for fifty, C for one hundred, D for five hundred and M for one thousand. If we ask what is the largest number that can be made with the first two symbols, it is VI = 6; with the first three, it is XVI = 16; with the first four, it is LXVI = 66, with the first five, it is CLXVI = 166; and with the first **six;** it is DCLXVI = 666.

Now that is mysterious! Six symbols with a value of 666 and also being the largest value these six can have! Would not that have grabbed somebody's imagination and led to all kinds of other associations with such a number? In the age when Pythagoras' views of number were still current, (and his views held numbers to have many properties besides quantity, which is our view today), it is very probable that this number intrigued the numerologists and 666 took on a life of its own.

Another topic: The Years of the Beast. The first year of the Beast was 666 A.D.; the second year of the Beast was 1332 A.D.; the third year of the Beast is 1998 A.D. What happened in 666? The Celtic Church was dismantled and plague swept Saxon England. What happened in 1332? The Bubonic Plague began in India. and spread to Europe - killing over half the population

DCLXVI The largest number, the upper bound the lid

The lid on what?

On what is permitted in spiritual development
by the Anti-christ

The Christ releases humanity to boundless
spiritual transcendance.

The anti-christ places a bound

And what or who places the bound on our spiritual development?

~~For the~~

In ancient times only Archimedes [the Sand Reckoner]
and the Hindus [~~Vrsna~~ Brahma] had large numbers.

The rest need a name for a big number
googol, Scillions...

They found it in DCLXVI – it became the "Scillion"

The Question of Interpretation

was 666 ⇒ a bound?

⇒ or boundlessness?

Did the Anti-Christ place a bound?
Or remove bound?

SO, Did ~~the~~ Christ place bounds?
or remove bounds? "I free you from the Law"

∴ The anti-christ placed bounds

GRTDIAL 3 1/2

MOSTHIGH.BBL

The Song of Moses Deut 32:1-

Deut 32:8 When the Most High divided to the nations their inheritance, when he separated the sons of Adam, he set the bounds of the people according to the number of the children of Israel.
9 For the LORD's portion is his people; Jacob is the lot of his inheritance. (KJV)

This is the only reference in the Bible to the Most High. The Higher God above the LORD

Most High ≠ the LORD

Psalm 95:3
For the LORD is a great God, and a great King above all gods.

ELIJAH3.BBL

GRTDIAL - 3 1/2

1 KINGS 20:28 And there came a man of God, and spake unto the king of Israel, and said, Thus saith the LORD, Because the Syrians have said, The LORD is God of the hills, but he is not God of the valleys, therefore will I deliver all this great multitude into thine hand, and ye shall know that I am the LORD.
29 And they pitched one over against the other seven days. And so it was, that in the seventh day the battle was joined: and the children of Israel slew of the Syrians an hundred thousand footmen in one day. (KJV)

1
3 3 3·1
18 $\frac{18}{3} = 6$ 3·2
666 $\frac{666}{6} = 111$ = 3·37
887112 $\frac{887112}{111} = 7992$ = 3·2664

$b_n = \frac{1+i^{2n}}{2}$

BEASTNUM.BBL

$a_n = a_{n-1} b_{n-1} + 2a_{n-1}^2$ $b_n = \frac{1+(-1)^n}{2}$

$a_0 = 1, a_1 = 3, a_2 = 18, a_3 = 666$

18 x 37

18 x [(2 x 18) + 1]

1 KINGS 10:14 Now the weight of gold that came to Solomon in one year was six hundred threescore and six talents of gold, (KJV)

Rev 13:18 Here is wisdom. Let him that hath understanding count the number of the beast: for it is the number of a man; and his number is Six hundred threescore and six. (KJV)

^Z

$a_0 = 1$
$a_1 = a_0[1+2a_0] = 3$
$a_2 = a_1[0+2a_1] = 18$
$a_3 = a_2[1+2a_2] = 666$
$a_4 = a_3[0+2a_3]$
$a_5 = a_4[1+2a_4]$

$a_0 = 1$
$a_1 = a_0 + (2 \times a_0^2) : 3$
$a_2 = (2 \times a_1^2) = 18$
$a_3 = a_2 + (2 \times a_2^2) = 666 = 2 \times 3^2 \times 37$
$a_4 = (2 \times a_3^2) = 887112 = 2^3 \times 3^4 \times 37^2$
$a_5 = a_4 + (2 \times a_4^2) = 1,57394 \times 10^{12}$
$\vdots = 887,112 \times 1,774,225$
$a_5 = 2 \times 18^2 \times 37^2 \times 25 \times 70969$ prime

$1 \times 18^1 + 2 \times 18^2$

$(2 \times 3^2) + 2 \times (2 \times 3^2)^2$

$a_2 = 2 \times a_1^2$

$a_3 = a_2 + 2 \times a_2^2$

$a_0 = 1$
$a_n = a_{n-1}\left[\frac{1-(-1)^n}{2} + 2a_{n-1}\right]$

0, 1 ⇒ recursion
a_{n+1}, a_n ⇒ iteration

3 many paths beyond. At 666 cannot decide

or

$a_n = a_{n-1}[b_{n-1} + 2a_{n-1}]$
where $a_0 = 1$
and $b_n = \frac{1+(-1)^n}{2}$

b_n provides the cyclical, or repetitive component in the iteration

The same stone which the builders rejected
has become the chief cornerstone

Psalm 118 : 22

666 = DCLXVI LARGEST POSSIBLE NUMBER WITH SIX SYMBOLS

$108 = 1^1 \cdot 2^2 \cdot 3^3$

108 x 3 = 324
108 x 4 = 432
756

324 x 432 = 139 968 = A

$108^2 = 11664$

$\sqrt{108} = 10.392305$
$(108)^{1/3} = 4.7622$
$(108)^{1/4} = 3.2237098$
$(108)^{2/3} = 22.678549$ x2 = 43.357 ≈ Ł tim 43.268
$A^{1/4} = 19.342259$

THE POPE: VICARIUS FILII DEI

V	5	I	1	D	500
I	1	L	50	I	1
C	100	I	1		
I	1	I	1		
V	5				
	112		53		501

112
53
501
666

MYTH MATH

Mathematics of the mythological and actual cycles of the calendars.

432	
~~423~~,000	# of years reckoned to the present cycle of time (Hindu sacred epics)
4,320,000	# of years reckoned in the "great" cycle within the current cycle falls
540	# of doors in Othin's (Wotan's) warrior hall (from the Icelandic Eddas)
800	# of warriors engaged in the battle of annihilation against the antigods
432,000	540 x 800
432,000	# of years between the time of the rise of the first city, Kish, to the coming of the Babylonian mythological flood (during which 10 kings reigned)
1656	# of years from the first day of Daan's creation to the first drop of rain of Noah's flood (counting the number of antediluvian patriarchs; see chart pg. 36)
86,400	# of 7 day weeks in 1656 years
43,200	86,400/2
18	2x9 and 1 + 6 + 5 +6 = 18; also 4 + 3 + 2 = 9
9	# traditionally associated with the Goddess Mother of the World (Devi, Inanna, Ishtar, Astarte, Artemis, Venus, etc.); # of the Greek Muses, patron goddesses of the arts Egyptian Judges 9 Supreme Court 9
108	1 + 0 + 8 = 9 12 x 9 male + fem $1^1 \cdot 2^2 \cdot 3^3$
432	108 x 4 = 432 $54 = \frac{180}{2}$
108	# of recited names in the litany of the goddess in India # of beads in mala
18	~~3x3x3~~ + 9 =18; # of times the Angeles tolls in the Catholic Church (in celebration of the Virgin's conception of the Savior and recognition of this miracle at the opening of a new world age) # of beads in rosary
25,920	# of years required for one complete cycle of the twelve zodiacal signs (reading of the vernal equinox around the 'beltway' of the zodiac)
60	# used as basic sexagesimal unit of astronomical measurement; used in ancient Mesopotania as 'soss'
432	25,920/60
18	2 + 5 + 9 + 2 + 0 = 18
60	A conditioned man's heartbeat
3600	60 heartbeats x 60 minutes in an hour
86,400	Heartbeats in a day
43,200	Heartbeats in one 12 hour period ~ basic frequency
432	# of optimum number of dimples in a golf ball for the perfect drive

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Representation of each integer by four 4's

0	$\frac{4-4}{4+4}$				25			60	$44+(4\times4)$
1	$\frac{4+4}{4+4}$	$\frac{4}{4^{4-4}}$			26			64	
2	$\frac{4}{4}+\frac{4}{4}$	$\frac{4\times4}{4+4}$			27			52	$44+(4+4)$
3	$\frac{4+4+4}{4}$	$4-\left(\frac{4}{4}\right)^4$			28	$44-(4\times4)$		56	
4	$4+\frac{4-4}{4}$	$4(4^{4-4})$			29			68	
5	$4+\left(\frac{4}{4}\right)^4$	$4+4^{4-4}$			30			72	
6	$4+\frac{4+4}{4}$				31				
7	$4+4-\frac{4}{4}$	$\frac{44}{4}-4$			32	$\frac{4^4}{4+4}$	$\frac{4^4}{4+4}$	172	$(4\times4)-4$
8	$4+4+4-4$	$\frac{4(4+4)}{4}$	$4\times4-(4+4)$		33			180	$(44\times4)+4$
9	$4+4+\frac{4}{4}$				34				
10	$\frac{44-4}{4}$				35				
11	44				36	$44-(4+4)$	$4(4+4)+4$	111	$\frac{444}{4}$
12	$4(4-\frac{4}{4})$	$\frac{44+4}{4}$			37			740	$444-4$
13					38			352	$44\times(4+4)$
14					39				
15	$4\times4-\frac{4}{4}$	$\frac{44}{4}+4$			40				
16	$\frac{4\times4\times4}{4}$	$\left(\frac{4+4}{4}\right)^4$	$4^{\left(\frac{4+4}{4}\right)}$	$4+4+4+4$	41			255	$44-\frac{4}{4}$
17	$4\times4+\frac{4}{4}$				42			256	$4^4+(4-4)$
18					43	$\frac{44}{4}-\frac{4}{4}$		257	$4^4+\frac{4}{4}$
19					44	$\frac{44}{4}\times4$		264	$4^4+(4+4)$
20	$4(4+\frac{4}{4})$				45	$44+\frac{4}{4}$		240	$4^4-4\times4$
21					46			248	$4^4-(4+4)$
22					47			272	$4^4+(4\times4)$
23					48	$4[(4\times4)-4]$		81	$(4-\frac{4}{4})^4$
24	~~$44-(4\times4)$~~				~~48~~	~~$4[(4\times4)-4]$~~		625	$(4+\frac{4}{4})^4$

$(4\times4)+(4+4)$

23

- 23 chromosome from each parent
- $\delta = \alpha^{-23}\mu^{-3} = \alpha\mu\left(\frac{m_0}{m_p}\right)^2$ = ratio of $\frac{\text{Coulomb Force}}{\text{Gravitational Force}}$ at Bohr Dirac's number

α = fine structure constant

$\mu = \frac{m_p}{m_e}$ $\quad m_0 = \sqrt{\frac{c\hbar}{G}}$

- A group of 23 people

~~50%~~ Chance 2 will have the same birthday

50%

PROJECT:
COLLECTION OF ARITHMETIC APPROXIMATIONS

e.g. $\frac{22}{7}$ for π $\quad 6\pi^5$ for μ

New Constant. [SN 99/06/12 p376] $k = 1.13198824$

$\Phi = 1.6180339887\ldots$

$\log_{10} k = 0.0538419$

$\ln k = 0.1239756$

$\log_2 k = 0.1788589$

$\log_2 k - \ln k = 0.0548833$

$\log_{\frac{1}{\Phi}} k = 0.257632$

$\log_{\Phi} k = -0.257632$

$\log_2 A = \log_{10} A \cdot \log_2 10$

$= \frac{\log_{10} A}{\log_{10} 2}$

LOG RULES

$\log_b A = -\log_{\frac{1}{b}} A$ $\qquad \log_{1/B} A = \frac{1}{\log_A B}$

$A^X = B$

$\log_A B = X$ $\qquad \log_B A = -\log_{\frac{1}{B}} A$

$\log_{\frac{1}{B}} B = -1$ $\qquad \log_y X = \log_z X \cdot \log_y z$

$\log_B B = 1$ $\qquad \log_B A \cdot \log_A B = \log_B B = 1$

$\sqrt{\log_B \frac{1}{B}} = i$

$2^a = 10^x$

$x = a \log_{10} 2$

$\log_{10} 2 = 0.30103\ldots$

$a = \frac{x}{\log_{10} 2} = 1$

$\frac{1}{\log_{10} 2} = 3.321928$ $\qquad X = YZ$

$10^X = 10^{YZ}$

$\log_2 A = \log_{10} A \cdot \log_2 10$

$X \qquad Y \qquad Z$

$2^X = A \qquad 10^Y = A \qquad 2^Z = 10$

$2^X = 2^{YZ}$

$X = YZ$

$2^a = 10^x$

$a \log_{10} 2 = x$

$A = \log\left(\frac{c^7}{G}\right) = 49.082\ldots$

$\log A = 1.6908\ldots \doteq (2\mu)^{3/2} = 1.6906\ldots$

THE COMMUTATIVE LAW:

$a+b = b+a$

$a \cdot b = b \cdot a$

Independence of order

THE ASSOCIATIVE LAW:

$(a+b)+c = a+(b+c)$

$(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Independence of aggregation

If ^ = exponentiation

$a \hat{} b \neq b \hat{} a$ $\quad 2^3 \neq 3^2$

$(a \hat{} b) \hat{} c \neq a \hat{} (b \hat{} c)$ $\quad (2 \hat{} 3) \hat{} 4 \neq 2 \hat{} (3 \hat{} 4)$

$8 \hat{} 4 \neq 2 \hat{} 81$

$4096 \neq 10 \hat{} 24.38343$

Every repeating decimal can be expressed by the quotient of two integers.

10/99 = 0.10 10 10 10 10 10 10 10 10 10 ...
110/909 = 0.121 0 121 0 121 0 121 0 121 0 121 ...
1110/9009 = 0.12321 0 12321 0 12321 0 12321 0 12321...
11110/90009 = 0.1234321 0 1234321 0 1234321 0 1234321...
111110/900009 = 0.123454321 0 123454321 0 123454321 ...
1111110/9000009 = 0.12345654321 0 12345654321 0 12345654321...
11111110/90000009 = 0.1234567654321 0 1234567654321 0 123467654321...
111111110/900000009 = 0.123456787654321 0 123456787654321 0 123456787654...
1111111110/9000000009 = 0.12345678987654321 0 12345678987654321 0 123...

99/10 = 9.9
909/110 = 8.263636363636363636363636363...
9009/1110 = 8.116216216216216216216216....
90009/11110 = 8.101620162016201620162016...
900009/111110 = 8.100162001620016200162001620016....
9000009/1111110 = 8.100016200016200016200016200016...
90000009/11111110 = 8.100001620000162000016200000... $= A = \frac{B}{10^5} + 8.1$
900000009/111111110 = 8.100000162000001620000016200...
9000000009/1111111110 = 8.100000016200000016200000016200 ...
| | | | | ||| ||| |||
18000000/111111111 = 0.162000000162000000162000000162... see B on next page

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12/99 = 0.12 12 12 12 12 12 12 12 12 12 12 ...
123/999 = 0.123 123 123 123 123 123 123 123...
1234/9999 = 0.1234 1234 1234 1234 1234 1234 ...
12345/99999 = 0.12345 12345 12345 12345 12345...
123456/999999 = 0.123456 123456 123456 123456 ...
1234567/9999999 = 0.1234567 1234567 1234567 .....
12345678/99999999 = 0.12345678 12345678 12345678 ...
123456789/999999999 = 0.123456789 123456789 123456789 ...

12/999 = 0.012 012 012 012 012 012 012 012 012 012 ...
123/9999 = 0.0123 0123 0123 0123 0123 0123 0123 ...
1234/99999 = 0.01234 01234 01234 01234 01234 01234...
12345/999999 = 0.012345 012345 012345 012345 012345...
123456/9999999 = 0.0123456 0123456 0123456 0123456 0123456...
1234567/99999999 = 0.01234567 01234567 01234567 01234567 ...
12345678/999999999 = 0.012345678 012345678 012345678 01234578...
123456789/9999999999 = 0.0123456789 0123456789 0123456789 0123...

$\frac{43}{37} = 1.162162\ldots$

18/111 = 0.162162162162162162.....
180/1111 = 0.162016201620162016201620....
1800/11111 = 0.162001620016200162001620016200....
18000/111111 = 0.162000162000162000162000162000...
180000/1111111 = 0.162000016200001620000162000016200000... = B
1800000/11111111 = 0.162000001620000016200000162000000...
18000000/111111111 = 0.162000000162000000162000000162...
180000000/1111111111 = 0.162000000016200000001620000000162...

$A = \frac{B}{10^5} + 8.1$

111/18 = 6.166666666666666666666666666666...
1111/180 = 6.172222222222222222222222222222...
11111/1800 = 6.172777777777777777777777777777...
111111/18000 = 6.172833333333333333333333333333...
1111111/180000 = 6.172838888888888888888888888888...
11111111/1800000 = 6.172839444444444444444444444444...
111111111/18000000 = 6.1728395
1111111111/180000000 = 6.172839505555555555555555555555...
11111111111/1800000000 = 6.172839506111111111111111111...
111111111111/18000000000 = 6.172839506166666666666666666...
1111111111111/180000000000 = 6.172839506172222222222222222...

$\frac{18}{111} + 1 = \frac{43}{37}$

$\frac{129}{111} = \frac{43}{37}$

$\frac{43}{37} - 1 = \frac{6}{37} = \frac{18}{111}$

$\frac{37}{43} = 0.\overline{860\,465\,116\,279\,069\,767\,441}$

repeats 21 places

$\frac{43}{37} = 1.\overline{162}$ repeats 3 places

43 − 37 = 6
43 + 37 = 80
43 × 37 = 1591

10/81 = 0.123456790 123456790 123456790 8 missing

20/81 = 0.246913580 246913580 246913580 7 missing

40/81 = 0.493827160 493827160 493827160 5 missing

50/81 = 0.617283950 617283950 617283950 4 missing

70/81 = 0.864197530 864197530 864197530 2 missing

80/81 = 0.987654320 987654320 987654320 1 missing 1/1.0125 = 81/80

101/81 = 1.246913580 246913580 246913580 7 missing

11/81 = 0.135802469 135802469 135802469 135802 7 missing

911/81 = 11.246913580 246913580 246913580 2469 7 missing

19/81 = 0.2345679 012345679 012345679 0123456 8 missing

91/81 = 1.12345679 012345679 012345679 012346 8 missing

1/81 = 0.012345679 012345679 012345679 0123457 8 missing

To create a recurring decimal:
abcdcba/9999999 = 0.abcdcba abcdcba abcdcba abc... Equal number of 9's replicates numerator

abcdbca/99999999 = 0.0abcdba 0abcdcba 0abcdcba Add another 9 to denominator, get 0's

1234567890/9999999999 = 0.1234567890 1234567890 1234567890 ...

1234567890/99999999999 = 0.01234567890 01234567890 01234567890 ...

123456789/999999999 = 0.123456789 123456789 123456789 ...

123456789/9999999999 = 0.0123456789 0123456789 0123456789 ...
= 1/81.000000729000006633900060368571 5

9876543210/9999999999 = 0.9876543210 9876543210 9876543210 ...
= 1/1.012499999886093750001423828125 99

1/9 = 0.11111111111111111111111111111111

2/9 = 0.22222222222222222222222222222222

3/9 = 0.33333333333333333333333333333333 = 4/3 - 1

4/9 = 0.44444444444444444444444444444444

5/9 = 0.55555555555555555555555555555555

6/9 = 0.66666666666666666666666666666666

7/9 = 0.77777777777777777777777777777777 = 16/9 - 1

8/9 = 0.88888888888888888888888888888888

9/9 = 0.99999999999999999999999999999999 = 1

1/11 = 0.090909090909090909090909	1/111 = 0.009009009009009009009
6/55 = 0.109090909090909090909	
9/22 = 0.409090909090909090909	
2/11 = 0.181818181818181818181818	2/111 = 0.018018018018018018018
1/55 = 0.018181818181818181818	
7/22 = 0.318181818181818181818	
3/11 = 0.272727272727272727272727	3/111 = 0.027027027027027027027
7/55 = 0.127272727272727272727	
5/22 = 0.227272727272727272727	
4/11 = 0.363636363636363636363636	4/111 = 0.036036036036036036036
2/55 = 0.036363636363636363636	
3/22 = 0.136363636363636363636	
5/11 = 0.454545454545454545454545	5/111 = 0.045045045045045045045
1/ 22 = 0.045454545454545454545	
8/55 = 0.145454545454545454545	
6/11 = 0.545454545454545454545454	
3/55 = 0.054545454545454545454	
7/11 = 0.636363636363636363636363	
9/55 = 0.163636363636363636363	
8/11 = 0.727272727272727272727272	
4/55 = 0.072727272727272727272	
9/11 = 0.818181818181818181818181	9/111 = 0.081081081081081081081

10/11 = 0.909090909090909090909090

$1^1 = 1$

$1 \times 2^2 = 4$

$1 \times 2^2 \times 3^3 = 108 \approx 1.08 \times 10^2$

$1 \times 2^2 \times 3^3 \times 4^4 = 27648 \approx 2.765 \times 10^4$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 = 86400000 \approx 8.640 \times 10^7$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 \times 6^6 = 4031078400000 \approx 4.031 \times 10^{12}$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 \times 6^6 \times 7^7 = 3319766398771200000 \approx 3.320 \times 10^{18}$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 \times 6^6 \times 7^7 \times 8^8 = 5569643794172655697920000 \approx 5.570 \times 10^{25}$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 \times 6^6 \times 7^7 \times 8^8 \times 9^9 = 215779412229418562091680268288000 \approx$
$\approx 2.158 \times 10^{34}$

$1 \times 2^2 \times 3^3 \times 4^4 \times 5^5 \times 6^6 \times 7^7 \times 8^8 \times 9^9 \times 10^{10} = 2157794122294185620916802682880 \times 10^{15}$
$\approx 2.158 \times 10^{44}$

	Logs to the base 10
	0
4	0.602060
108	2.033424
	4.441664
	7.936514
	12.605421
	18.521108
	25.745827
	34.334010
	44.334010

	Logs to the base e
	0
4	1.386294
108	4.682131
	10.227309
	18.274498
	29.025054
	42.646427
	59.281957
	79.056979
	102.082830

$19.660782 \approx \frac{5}{2} = 19.677440$

$60.720425 \approx 60.724431 = (\alpha\mu S)^{3/2}$ (109.0)

Logs to the base 2

	0
4	2.000000
108	6.754888
	14.754888
	26.364528
	41.874302
	61.525789
	85.525786
	114.055112
	147.274393

34/57 = 0.596491228070175438 596491228070175438 596... [18]

57/34 = 1.6 7647058823529411 7647058823529411 764... [16]

111/18 = 666/108 = 6.166666666666666666666666666666

18/111 = 108/666 = 0.162162162162162162162162162162

9009/111 = 81.162162162162162162162162162

111/9009 = 0.012321 012321 012321 012321 012321 0123

111111111/9000000009 = 0.012345678987654321 012345678987654321 0123...

9000000009/111111111 = 81.000000162000000162000000162 ...

18000000000/111111111 = 162.000000162000000162000000162...

111111111/18000000 = 6.1728395

123456789/9999999999 = 0.0123456789 0123456789 0123456789 0123...

1/81 = 0.0123456789 0123456789 0123456789 0123...

9999999999/123456789 = 81.000000729000006639000603684905