Some Words for & from Math

#91 of Gottschalk's Gestalts

A Series Illustrating Innovative Forms
of the Organization & Exposition
of Mathematics
by Walter Gottschalk

GG91-1 (54)

☐   some good words & phrases
with a math flavor

• numeration = the naming of numbers

• template problems
= problems with a fixed pattern of statement
and that can be solved with a method that is
pre-assigned rote & routine

• short shots mathwise
= brief perhaps random comments
of a mathematical relevance
(self-reference? reference here?)

• the raiment of mathematics
= its special words & symbols & diagrams

• 'the miraculous multiplex'
= ? the notion of set
is a phrase from the poem
' A Primitive Like an Orb'
by Wallace Stevens

GG91-3

• a short succession:
square
cube
biquadrate

• standards of literary merit:
* grace of style
* vigor of prose
* originality of expresssion

• what graphs can do/exhibit:
go up/go down
rise/fall
upside/downside
upswing/downswing
upturn/downturn
overshoot/undershoot

• movers & shakers
(include mathematicians?)

• do's & dont's
= do's & taboo's

G91-4

• the general case = the generic case
(from 'genus'singular & 'genera' plural)

• a particular case = a specific case
(from 'species' both singular & plural)

• the three famous
geometric construction problems
of antiquity
* cube duplication = the duplication of the cube
* angle trisection   = the trisection of the angle
* circle quadrature = the quadrature/squaring of the circle
(suggesting 2, 3, 4 in order)

• The Math Maven
= any one of us

• flaw/fluke
are other words suggesting 'error'

• flim-flam
is a word suggesting deliberate misdirection

• copy = isomorph

GG91-5

• precepts may mystify,
  examples can clarify

• here, there, and everywhere
past, present, and future
then, now, and forever
up, down, and sideways
yesterday, today, and tomorrow

• good, bad, or indifferent
positive, negative, or zero
provable, disprovable, or undecidable

• genes vs culture
heredity vs environment
innate vs learned
nature vs nurture
¿which is the primary origin
of individual mathematical ability?

GG91-6

• adequate/intended/preferred interpretation

• provisional hypothesis

• heuristic guideline

• useful description

• better approximation

• a duality:
science/scientist
=
experiment/experimentalist
&
theory/theorist

• make/take your choice:
gloom & doom
vs
bloom & boom

- go-no-go
= stop & start

- flourish or falter

- publish or perish

- a black box
= df a device
of known external function
but
of unknown internal structure

- the operator/operation
operates on
the operands

- a trap-door function
= df a function that is easy to compute
but
its inverse function is hard to compute

• BEST

  I I X

  BETS

• of obscure origin

$=_{ab}$ o^3

• some small samples should suffice

$=_{ab}$ s^5

• gestalt   (English noun)
= df a configuration
with the added sense of
'unified whole with properties not derivable from
the sum of the individual parts
such as relationships among individual parts'
↑

die Gestalt (German noun)
= figure, form, shape

GG91-9

☐ how language can shorten words

consider the history of
'my lady'
& count the letters as it changes

mea domina   (Latin)
↓

madonna   (Italian)
↓

madame   (French)
↓

madam   (English)
↓

ma'am   (English colloquial)
↓

yes'm & no'm (English vocalic consonant of one letter)

G91-10

☐ names of #

• crisscross

• crosshatch

• double cross

• number sign as prefix (as in #2 = number two)

• octothorpe (so named because of eight points
         and in honor of the Native American
         football player Jim Thorpe)

• pigpen

• pound sign as suffix (as in 2# = two pounds)

• tic-tac-toe sign

☐ the eight periodic phases of the moon

• new moon

• waxing crescent moon (interval)

• first quarter moon

• waxing gibbous moon (interval)

• full moon

• waning gibbous moon (interval)

• last quarter moon

• waning crescent moon (interval)

• new moon

etc

GG91-12

☐ the human brain
is the most complex
piece of machinery in the universe

• the adult human brain
is about the size of two clenched fists held together
& weights about 3 pounds

• the human brain contains
ca 100 billion neuron=nerve cells
&
ca 100 trillion connections between them

GG91-13

• the functions of the two sides = hemispheres
of the human brain
are in strong contrast to one another
viz

* the left side of the human brain is
one-dimentional
linear
analytic
verbal
numerical
algebraic

* the right side of the human brain is
many-dimensional
nonlinear
synthetic
pictorial
geometric
topological

GG91-14

• the two sides of the human brain
also process information differently
viz

* the left side processes information
in succession
sequentially
locally
temporally

* the right side processes informaton
simultaneously
globally
spatially

GG91-15

□ templates of language

• the structure of a
definition

definiendum   definer   definiens

wh
definiendum   (Latin)
= that which is to be defined

definiens   (Latin)
= that which does the defining

definer
= that which connects
definiendum & definiens
and means
is defined to be (for an object)
or
is defined to mean (for a word or phrase or clause);
the definer may be symbolized by = df

• to summarize definitively:
in a definition
the definiendum is defined to be/mean the definiens

GG91-16

• the structure of an
implication theorem

hypothesis   implier   conclusion

wh
hypothesis
= that which is to be assumed

conclusion
= that which is to be deduced

implier
= that which connects
hypothesis & conclusion
and means
implies
in the sense that
the conclusion is provable from the hypothesis;
the implier may be symbolized by $\Rightarrow$

and read 'implies'

• to summarize conclusively:
in an implication theorem
the hypothesis implies the conclusion

GG91-17

• the structure of a
conplication theorem

conclusion conplier hypothesis

wh
conclusion
= that which is to be deduced

hypothesis
= that which is to be assumed

conplier
= that which connects
conclusion & hypothesis
and means
conplies
in the sense that
the conclusion is provable from the hypothesis;
the conplier may be symbolized by $\Leftarrow$

and read 'conplies'

• to summarize hypothetically:
in a conplication theorem
the conclusion conplies the hypothesis

GG91-18

• the structure of an
equivalence theorem

antecedent equivalenter subsequent

wh
equivalenter
= that which connects
antecedent & subsequent
and means
is equivalent to
in the sense that
antecedent and subsequent are provable from each other;
the equivalenter may be symbolized by ⇔

and read 'is equivalent to'

• to summarize equivalently:
in an equivalence theorem
the antecedent is equivalent to the subsequent

GG91-19

• various templates for theorems
are suggested by the following

IT. $H \Rightarrow C$

IT. if H then C

IT. let H then C

CT. $C \Leftarrow H$

CT. C if H

ET. $A \Leftrightarrow B$

ET. A is equivalent to B

ET. A if and only if B

ET. A iff B

ET. tfsae: A, B

ET. tfsape: A, B, C

etc

□ opposed notions

Δ proof vs disproof

let

$\varphi \in$ closed formula / sentence

then

- a proof of φ

= a disproof of $\neg\varphi$

- a disproof of φ

= a proof of $\neg\varphi$

Δ example vs counterexample

let

$P \in$ predicate / property

then

- an example of P

= a counterexample for $\neg P$

- a counterexample for P

= an example of $\neg P$

□ ¿ what is the difference between the meanings of
explanation
&
explication?

• in general the two words are synonyms
but
there is a difference of some significance
viz
explication
is expected to be
more elaborate
fuller
in more detail
than relatively simpler
explanation

GG91-22

☐ the four kinds of child prodigies

  child prodigies
= die Wunderkinder (German)
   (sing: das Wunderkind)
= lit: miracle children
appear in only four fields
viz
• chess
• languages
• mathematics
• music

¿is there an explanation?

yes, because in these four fields
talent is far more important than experience

GG91-23

□ names of powers of twelve

pattern
• unit = abbrevation
value

• dozen = doz
12

• gross = gr
dozen dozen = 12^2 = 144

• great gross = ggr
dozen gross = 12^3 = 1728

also
baker's dozen = $12 + 1$ = 13
for good measure & for good will

☐ the abreviation
'no' for 'number'
comes from the first & last letters of
the ablative case
numero
of the Latin noun
numerus
which means 'number';
but 'no' is already an English word;
I suggest a better abbreviation would be
'nr' for 'number'
which consists of the first & last letters
of the English word itself

GG91-25

□ the most important notion/word in mathematics

Δ etymology

set
↑

sette   (Middle English)
= set
↑

sette   (Old French)
= sequence
↑

secte   (Old French)
= sect
↑

secta   (Latin)
= sect, following
↑

sequi   (Latin)
= to follow

GG91-26

Δ in various languages

English → set

French → ensemble

German → die Menge

Italian → ceto

Russian → mnozhestvo (in Cyrilic alphabet)

Spanish → conjunto

Δ a hierarchy in ascending order downward
• set
• class
• collection
• cluster
• aggregate
• assemblage
• totality

subitem ⊂ item ⊂ superitem

superitem ⊃ item ⊃ subitem

GG91-27

Δ the seven major biological

taxons = taxonomic categories
in descending order downward
• kingdom
• phylum
• class
• order
• family
• genus
• species

mnemonic for middle: PCOF = pe-koff
ends are easy to remember

GG91-28

Δ nine words constituting ZF

the usual nine axioms
(not independent however)
for
the Zermelo-Fraenkel theory of sets = ab ZF
are called the axioms of:
• extensionality
• pairing
• union
• infinity
• foundation
• powerset
• choice
• comprehension
• replacement

GG91-29

Δ here are four quotations
that are descriptive of the nature of sets

• Un pour tous, tous pour un.   (French)
= One for all, all for one.
= the motto of Switzerland

• One for all or all for one we gage.
by
William Shakespeare
1564-1616
English
dramatist, poet
from his poem
Lucrece (1594), line 144

• Tous pour un, un pour tous, c'est nos devise. (French)
= All for one, one for all, that's our motto.
by
Alexandre Dumas père (= father)
1802-1870
French
novelist. dramatist
from his novel
Les Trois Mousquetaires (1844), ch 9
= The Three Musketeers

• E pluribus unum. (Latin)
= lit: From many one.
= One from many.
by
Virgil
70-19 BCE
Roman
poet
adapted from his poem
Moretum
= a rustic salad made of
garlic, parsley, vinegar, oil, etc

E pluribus unum.
is a motto appearing on
the Great Seal of the United States;
meaning that many states/people unite
to form one nation

Δ in the second edition (1989) of
   OED
= The Oxford English Dictionary
= the granddaddy of them all
the word 'set' has
22 large pages of 3 columns each
in explanation

Δ inverse processes

$$\text{the elements} = \text{many} \left\{ \begin{array}{c} \rightarrow \quad \text{unification} \quad \rightarrow \\ \leftarrow \text{individuation} \leftarrow \end{array} \right\} \text{one} = \text{the set}$$

Δ from words to symbols

• E pluribus unum.

.... → .

• All for one and one for all.

∀ → 1 & 1 → ∀

☐ variations in word & notion
on the most basic theme in mathematics

• set & element

• class & member

• collection & individual

• band & performer

• body & organ
   organ & cell

• clan & family
   family & member

• crowd & person

• expression & term

• figure & point

GG91-33

- library & book
  book & chapter
  chapter & paragraph
  paragraph & sentence
  sentence & word
  word & letter

- list & item

- matrix & entry

- orchestra & musician

- ordered tuple & coordinate

- range & value

- sequence & term

- series & term

- table & entry

- team & player

- type & token

- vector & component GG91-34

□ variations in word & notion
on a basic theme in mathematics

• set & subset

• class & subclass

• collection & subcollection

• curve & arc

• genus & species

• space & region

• total & partial

• whole & part

• x & subx
wh x = group, ring, field, manifold, matrix, module,
space, structure, system, etc

GG91-35

☐ some common words/phrases containing or related to math terms

Δ center

• art/cultural/garment/manufacturing/medical /railroad/shipping/shopping/tourist/trade/urban/etc center

• center of attention

• center of attraction

• center of consciousness

• center of interest

• centermost

• centerpiece

• central

• centralized

GG91-36

- centrifugal force

- centripetal force

- concentric

- eccentric

- egocentric

- geocentric

- homocentric

- in the center of

- stormcenter

- to center around/round

- to center in/on

Δ circle

• circle of friends

• circle of influence

• ¡Circle the wagons!

• square circle

• the circles in which one moves

• to circle back

• to encircle

• to go around in circles

GG91-38

Δ figure

• figurative

• figurehead

• figure of speech

• Figures don't lie but liars figure. (saying)

• figure skating

• figurine

• in n figures

• slim/trim figure

• to cut a fine figure

• to figure in

• to figure it out

Δ focus

• confocal

• focal point

• focus of attention

• focus of infection

• primary/prime focus

• to bring into focus

• to bring/come to a focus

• to focus on

Δ line

• between the lines

• clothes line

• Don't give me that line!

• down the line

• electric line

• in a straight line

• in line for

• line drawing

• line drive

• line engraving

• line item

• line judge

GG91-41

- line of credit

- line of duty

- line of print

- line of type

- line of scrimmage

- line of sight

- line of work

- line printer

- line score

- line squall

- line storm

- line-haul

- lineage

- lineal

- lineaments

- linear

- Linear A

- Linear B

- linear accelerator

- lineation

- linebacker

- linecaster

- linecut

- lineman

- liner

- liner notes

- linesman

- lineup

- midline

- oceanliner

- online

- on the line

- outline

- sideline

- telegraph line

- telephone line

- to arrange in a line

- to be the first/second/etc/last in line

- to lay it on the line

- to line up

- to make a bee line for

- power line

- What's My Line?

GG91-45

Δ point

- all-points broadcast = APB

- all-points bulletin = APB

- breaking point

- brownie points

- focal point

- in point of fact

- mortgage points

- point guard

- point in question

- point man

- point of convergence

- point of departure

- point of interest

- point of no return

- point of reference

- point of view

- point-blank

- pointer

- pointillism

- pointless

- straight to the point

- ¡That's my point!

- The point is ...

- the vanishing point

- to come to a point

- to get the point

- to get/go straight to the point

- to get/go/travel from point A to point B

- to make a/the point

- to point out

- to point (out) the direction/way

- to point the finger at

- to shave points

- turning point

- up to a point

- What's the point?

- without point

GG91-48

Δ square

- a square peg in a round hole

- foursquare

- square bracket

- square circle/ring

- square dance

- square deal

- square knot

- square meal

- square one

- square-rigger

- to square off

GG91-49

Δ straight

• in a straight line

• straight as an arrow

• straight chain

• straight face

• straight flush

• straight man

• straight off

• straight out

• straight poker

• straight razor

- straight-ahead

- straight-arm

- straight-arrow

- straight-laced

- straight-line

- straight-a-way

- straightaway

- straightbred

- straightforward(s)

- straightway

- the straight and narrow

- to straighten (out)

Δ a few others

• common denominator

• curveball

• curvilinear

• geometrid

• liminal & subliminal

• lowest common denominator

• sphere of influence

• the eternal triangle

• the line/path of least resistance

• the Pentagon

• to grade on the curve

Δ a short sample of number references

• A stitch in time saves nine. (adage)

• baker's dozen = 13

• Big One = a one-hundred dollar bill

• boxcars = a throw on two dice of double-six

• century = one hundred years

• decade = ten years

• dozen =12

• for seven days a week

• fortnight = a period of 14 days

• for twenty-four hours a day

• love (sports score) = 0

GG91-53

• millenium = one thousand years

• my one and only

• on a scale from one to ten

• One for the money,
Two for the show,
Three to make ready,
And here we go!

• sawbuck = a ten-dollar bill

• school larnin'
= the 3 R's
= readin' & 'ritin' & 'rithmetic

• score = 20

• The Four Horsemen of the Apocalypse

• the third degree

• three little words

GG91-54