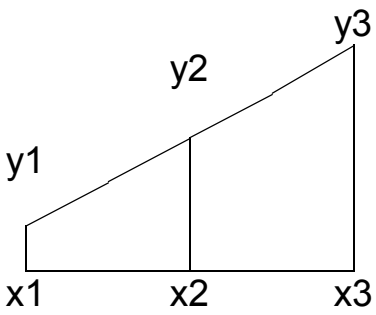
Visual Math

Interpolation and extrapolation

Variables are ordered and a trapezoid x1 y1 y3 x3 is created and desired: y2 from x2.



y1	y2	y3
50	78	90
20	48	60
x1	x2	x3

Excel	X	Y
1	20	50
2	48	78
3	60	90

$$y2 = y1+(x2-x1)*(y3-y1)/(x3-x1) \quad [1]$$

In Excel, formula can be inserted into standard cells Y2, etc.
Interpolation is possible: for 4 cells and tables entirely.
Interpolation and extrapolation are possible through graphical programs.
Coordinate in middle: arithmetic mean $y2 = (y1+y3)/2$ [2]

Excel formulas

Example: Excel multiplication table and multipliers horizontally and vertically.

Product is calculated by formula =B$1*$A2 [3]
where $ sign makes a row or column constant and formula expands.

If $ sign is assigned to a row and a column at same time: =B1*1000 [4]
Cell with 2 $ signs: constant when copying and pasting.

Word automation

Word can automatically number ordinals, such as paragraph numbers or image numbers or formula numbers, and rearranging paragraphs provides numbers in order.

Word includes headers and footers for decorating repeating elements.
Word can automatically number pages and write number of pages.
Word formulas can be arranged in a table by setting invisible cell borders.

Word can replace characters using special characters,
for example, multiple Enter in a row is replaced by 2 Enter.

Word or Excel can create a simple macro manually from actions on screen.

Visual Math

Inflation

Inflation to power of years calculates price multiplier

Inflation ^ Years = Factor [5]

Inflation: Inflation = Factor ^ (1 / Years) [6]

Years: Years = LOG(Factor)/LOG(Inflation) [7]

Example: if multiplier is 12 over 15 years: inflation =12^(1/15) = +18%.
Example: if multiplier is 12 & inflation is 18%, years: =LOG(12)/LOG(1,18) = 15 years.

Salary

Suppose several workers receive a small salary and 1 manager receives a large salary and it is required to find number of employees to form a given average salary.

We denote: B = high pay and C = average pay and M = low pay and N = number of employees who receive little and mean

(B+M*H)/(H+1)=S [8]

H = (B-S) / (S-M) [9]

Excel compatible programs allow you to assign any names to cells to left of formula bar, and formulas in Russian are possible.

Example: B=300 and M=28 and C=45 and H = (B-S) / (S-M) = (300-45) / (45-28) =
= 255/17 = 15 people and check: =(300+28*15)/(15+1) = 45.

Math programs calculate N = (S-B)/(M-S).

Formulas in detail:

$$(B + M * H) / (H + 1) = C \Rightarrow B + M * H = C * (H + 1) \Rightarrow B+M*H = S*H+S$$

$$S*H-M*H = B-S \Rightarrow H * (S-M) = B-S \Rightarrow H = (B-S) / (S-M)$$

Definitions

Integral: sum of multiplications of quantity and quality.
Logarithm: number of multiply to desired result: "to what degree to raise".
Factorial: Multiply from 1 to desired number.
Derivative: tangent of slope of graph's tangent.

Percentage: 1 in 100 parts and permille: 1 in 1000 parts.
Probability: event opportunity 0 <= P=events/variants < 100%. [10]

Integral: from word integer.
Logarithm: from word ratio.
Factorial: from word multiplying.

Visual Math

Derivative

Derivative: tangent of slope of tangent of function graph.

Derivative 1st: minimax function.
Visual: horizontal tangent plot of a function.

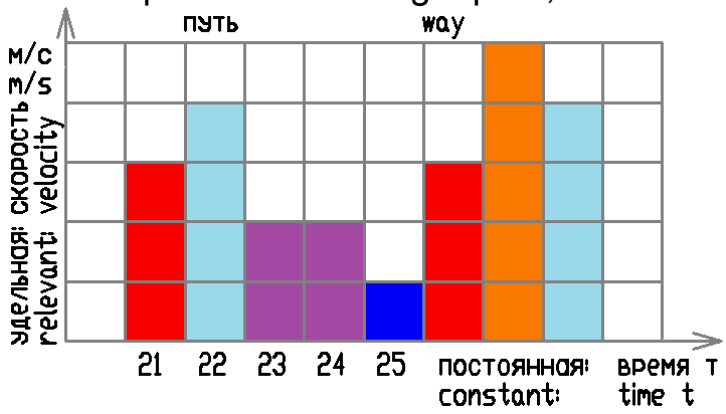
Derivative 2nd: function inflection.
Visually: change in direction of angular movement of tangent of graph.

Path and derivative 1st: speed.
Derivative 2nd: acceleration and derivative 3rd: start.

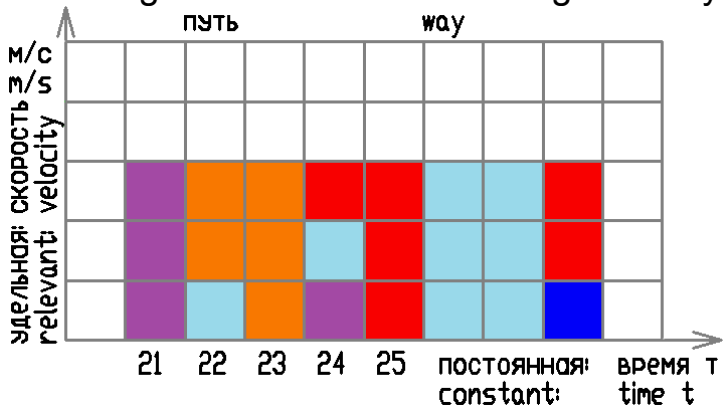
Integral

Constant value: time, seconds.
Specific value: speed, meters per second.
Time periods: 1 second.

Each square product: time seconds
multiplied by speed of meters per second and get path, meters.



Summing up entire path for a given time and distributing it evenly over time:



Vertical average speed of 3 meters per second, shows mean value of integral.

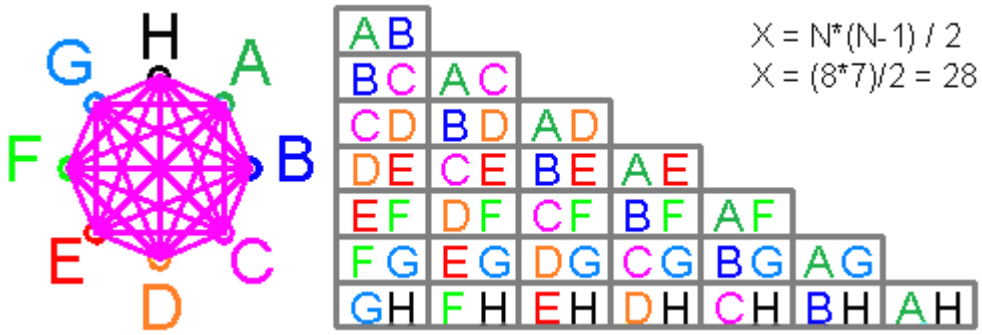
Visual Math

Combinatorics

Number of combinations of 2 characters: N = X * (X-1) / 2 [11]

		A	B	C	D		
B		AB					A D
C		AC	BC				
D		AD	BD	CD			B C
E		AE	BE	CE	DE		

X=3 a b c N =3*2/2 =6/2 =3 ab ac bc
X=5 a b c d e N=5*4/2=20/2=10 ab ac ad ae bc bd be cd ce de



Connect of 2 points encrypt 2 bits of a 2-ry of form DA = 1001.
Transport task: number of connections by 2 points.
Combinations of 2 topics of this manual are possible.

Pattern Excel

Events 2-ary controls multiplication of events, including =NOT() functions
X = (A1 | NOT(A1)) ... * … * (AN | NOT(AN)) = (0 | 1) [12]
Example: find an event like 1010011:
=A1 *NOT(A2) *A3 *NOT(A4) *NOT(A5) *A6 *A7 = (0=no | 1=yes) [13]
Explored big data is possible in non-consecutive cells.

Another pattern checks all numbers in a row from 1 to N are mixed:
for "2 4 5 3 1" = 2^2 +2^4 +2^5 +2^3 +2^1 = 62 = 2^(N+1)-2 [14]

Guess number

computer guesses number X, guessed automatically or by a person,
for number of steps logarithmic N = LOG(X;2) [15]
Guessing is optimal to start from middle of array.

For example, 1 out of a billion is equal to 1 out of X=10^9, guessed in N=30 moves:
N = LOG(10^9;2) = 30 [16]

Dependency of 10-ary and 2-ary: 10^3 = 2^10 [17]

Number of N guesses X: for each increase in X by 1000 times +10 guesses.

Visual Math

Speed

Speed from kilometers per hour to meters per second is translated by formula based on 36 km/h = 10 m/s

V(m/s) = V(km/h) / 3.6 [18]

V(km/h) = V(m/s) * 3.6 [19]

It is useful to translate speed of kilometers per minute into meters per second in your mind

1 km/minute = 60 km/h = 16.7 m/s [20]

Examples: 20 m/s = 72 km/h = 1.2 km/min or 8000 m/s = 28800 km/h = 480 km/min.

Excel proportion

3 cells A1, B1, A2 are filled
and formula is set in cell B2 =B1*A2/A1 [21]
Example: video scaling and screen resolution are calculated.

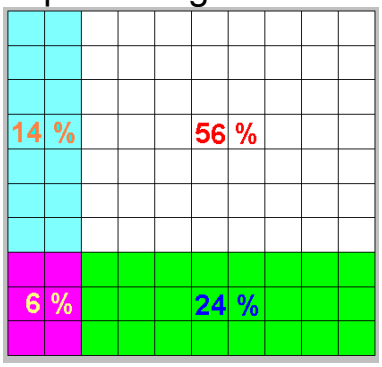
	A	B
1	A1	B1
2	A2	**B2**

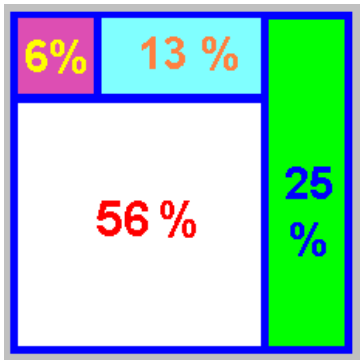
Excel	A	B
1	16	9
2	1280	**720**

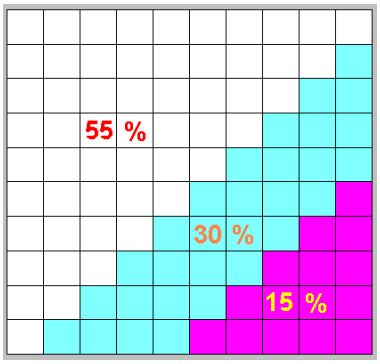
Example: assessing incidence, proportion is calculated:
number of inhabitants of region relative to number of inhabitants of country and planet.

Binomiality

Binomial: each element is approximately 2 times next.
Binomial percentage distribution: 56 +24 +14 +6 = 100.







A square 10x10 = 100 cells divides point at location 2 into 3 cells
and whole zones are obtained 2x3=6 and 2x7=14 and 3x8=24 and 7x8=56.

Possibly specific to processes where a 2 by 2 table is created
and a pattern is noticeable: 24% is 4 times more than 6% and 56% / 14% = 4.
Shared formula x+2x+4x+8x=100 & x=6,67 & relations 80%\20% & 70%\30%.

An array of thousands of random elements 1 0 1 0 1 creates similar chains in a row and same number of chains in a row is distributed binomially, of form:
1 in a row 64 pieces, then 2 in a row 32 pieces and 3 in a row 16 pieces, etc., which means that array under study, distributing chains in a row binomially: random and quantum random observe principles of binomial distribution.

Percent

Having deposit money at P% for Y years, expect multiplier M. M = (1+P/100)^Y [22]

Percentage P = -100*(1 -M^(1/Y)) [23]

or Percent P = 100*(M^(1/Y)-1) [24]

Years Y = LOG(M)/LOG(1+P/100) [25]

Probability Reliability

Probability of an event and reliability of probability are given, and it is possible to calculate normal number of repetitions of similar cases in a row.
P - probability of event, for example 25% = 0.25 = 1/4 = ¼ = 25/100.
C - reliability of case, for example 99% = 0.99 = 99/100.
N - number of similar cases in a row.

Match and mismatch are interchangeable and probability of a match is one minus probability of a mismatch, then C=1-c and c=1-C and P=1-p and p=1-P and these formulas are valid for probability over 50%.

Probability multiplication including reliability C+(1-P)^N=1 [26]
calculating degree, calculates number of similar cases in a row

N = LOG(1-C)/LOG(1-P) [27]

Example: reliability C=99% probability P=25%
Normal number of similar in a row N = LOG(1-0.99)/LOG(1-0.25) = 16
and it means that at a probability of 25% it's normal not to match 16 times in a row
and real mathematicians understand difference between LOG and LN in formulas.

Simplified formula N = 7+(5*(1/P-2)) [28]
Example: P=0.1 and N=47 is normal and P=0.78 and N=4 is normal.

Inverse problem: calculate probability of a case if reliability is ensured for a given number of cases P = 1 - (1-C)^(1/N) [29]

Let's calculate reliability of probability.

Each worker does 78% of work.
Determine number of employees to complete work by 99%.

Given: probability P=78% and reliability C=99%.
Formula: C+(1-P)^N=1.
N = LN(1-C)/LN(1-P) = LN(1-0.99)/LN(1-0.78) = 3.
Answer: 3 workers are needed.

Division of such cases in a row in reality: temperature seams of rails and change of seasons and change of time of day and breathing and sleep and wages, etc.

Probability Reliability

Table filling formula: =LOG(1-$B6/100)/LOG(1-1/D$1) [30]

Success Probability	1 of …		2	3	4	5	10	100	1.5	1.25		Success Probability
Refusal Probability	%		50 %	66 %	75 %	80 %	90 %	99 %	33 %	80 %		Refusal Probability
			Similar IN a ROW									
Reliability	90%		3	6	8	10	22	229	2	1		Reliability
Reliability	**99%**		**7**	**12**	**16**	**21**	**44**	**458**	**4**	**3**		**Reliability**
Reliability	99.5%		10	17	24	31	66	687	6	4		Reliability
Reliability	95%		4	7	10	13	28	300	3	2		Reliability
Reliability	50 %		1	2	2	3	7	69	1	0		Reliability
			Similar IN a ROW									
Refusal Probability	%		50 %	66 %	75 %	80 %	90 %	99 %	33 %	80 %		Refusal Probability
Success Probability	1 of …		2	3	4	5	10	100	1.5	1.25		Success Probability

To guess probability of 25%=1/4=0.25 and get 99% reliability
You need 16 consecutive actions.

Permutations and factorial

Given: 5 books to read in order.
Find number of options for reading books.

We distribute books according to list:

1st book can be read anywhere from 5
2nd book can be read anywhere from 4
3rd book can be read anywhere from 3
4th book can be read anywhere from 2
5th book can be read anywhere from 1

Multiplying: = 1 * 2 * 3 * 4 * 5 = 120 options for reading order of 5 books.

number of permutations calculates factorial of a number N! = 1 * … * N [31]

Sorting and Shuffling Excel

Excel sorting is possible for 1 column and for several related columns.
Excel shuffling occurs through ordering of random cell values created by a formula of form =randbetween(1;1000) [32]
Next, by copying a random array and inserting it into a free column as a «Special Insert – Values» and sorting linked list with data.

Visual Math

Fractions

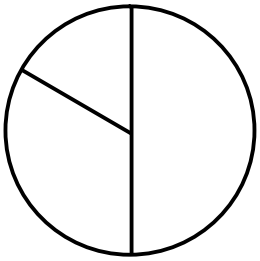
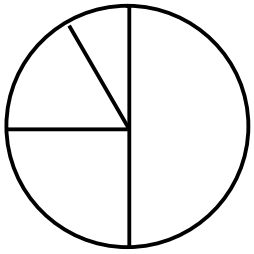
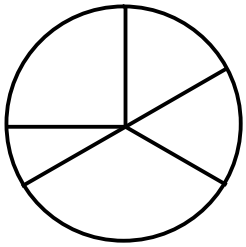
It is important to visually understand simple fractions in order to evaluate:
result is greater than 1 or result is less than one,
for example 5/4 > 1, but 4/5 < 1 without conversion to decimals.

Table shows sums of 2 fractions, where some results are often found in reality and it is convenient to notice obvious fractions of form 1/5 of 25 hours
& count fractions of third & quarter in mind & multiply money in form =50*12 =600.

Sum of fractions		0,5	0,33	0,25	0,2	0,167	Rule
		1/2	1/3	1/4	1/5	1/6	
0,5	1/2	1					$\frac{1}{A} + \frac{1}{B} = \frac{A+B}{A*B}$
0,33	1/3	5/6	2/3				
0,25	1/4	3/4	7/12	1/2			
0,2	1/5	7/10	8/15	9/20	2/5		
0,167	1/6	2/3	1/2	5/12	11/30	1/3	

[33]

Circle is visually clearer and examples show sums of fractions of circle
that are nearby, for example = 1/2 + 1/3 = 5/6 or = 1/6 + 1/3 = 1/2.
Another diagram quickly shows = 1/6 + 1/12 = 1/4.
Another diagram quickly shows = 1/12 + 1/4 + 1/6 + 1/6 = 2/3.
Plus, other options are visible and their combinations are possible.

Verification table of decimals: calculates 1 formula

C3 =C$2+$B3 [34]

and then copied horizontally and vertically

	A	B	C	D	E	F	G
1	Sum of fractions		1/2	1/3	1/4	1/5	1/6
2			0,5	0,33	0,25	0,2	0,167
3	1/2	0,5	**1**				
4	1/3	0,33	0,833	0,667			
5	1/4	0,25	0,75	0,583	0,5		
6	1/5	0,2	0,7	0,533	0,45	0,4	
7	1/6	0,167	0,667	0,5	0,417	0,367	0,333

Beam

Bending stiffness of beam depends on value of «moment of inertia» I, m^4 meters to 4th power and calculates formula:

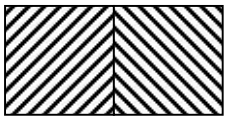
$$I = \frac{bh^3}{12} \quad [35]$$

where b is width of beam section
and h is height of beam section

and formula itself is derived as an integral in terms of antiderivatives.

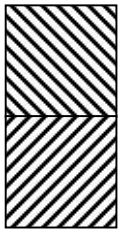
Let's say a beam with dimensions of section 2b and h=b

Then formula: $I = \frac{2 * b * b^3}{12} = \frac{2\,b^4}{12}$



Let's say a beam with dimensions of section b & h=2b separately

Then formula: $I = \frac{b * 2 * b^3}{12} = \frac{2\,b^4}{12}$



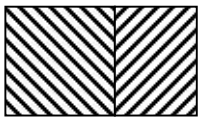
Suppose a beam with dimensions of section b & h=2b is one

Then formula: $I = \frac{b * (2 * b)^3}{12} = \frac{8\,b^4}{12}$

Conclusion: vertical section of a single beam is 4 times better.

Quadratic equation

Let's say in field a plot where 1 side is x meters
and other side is 45 meters longer.
Find x so that area of site becomes 10,000 m^2.

x 

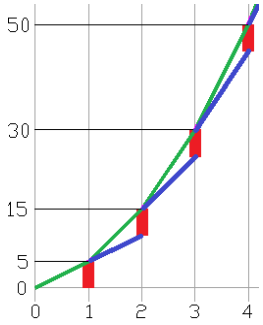
We compose a quadratic equation of form $ax^2 + bx + c = 0$ [36]

$$x1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} = (- b + sqrt (b^2 -4*a*c))/(2*a) \quad [37]$$

$$x2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} = (-b – sqrt (b^2 -4*a*c))/(2*a) \quad [38]$$

Equation of task about site: x * (x + 45) = 10000
$x^2 + 45x - 10000 = 0$, where a=1, b=45, c= -10000.
Discriminant $D = b^2 - 4ac$
D = 45*45 - (4*1*(-10000)) = 42025

x1 = (-45 + 205) / (2*1) = 80 m
x2 = (-45 - 205) / (2*1) = -125 m < 0 impossible distance.
Check: = 80 * (80 + 45) = 80m * 125m = 10000 m^2 .



Parabola $y=x^2$ graph: constant increment of change

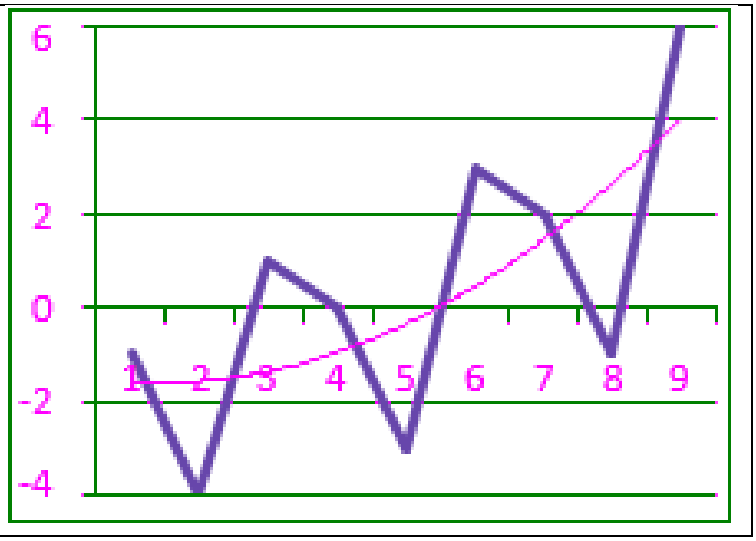
Cumulative Excel chart

Cumulative graph shows integral of data, summing up previous total and next result

B3 =B2+A3 [39]

and copying cell B3 down and then inserting graph and adding a trend line.

	A	B
1	Result	Total
2		
3	-1	**-1**
4	-3	-4
5	5	1
6	-1	0
7	-3	-3
8	6	3
9	-1	2
10	-2	-1
11	7	6



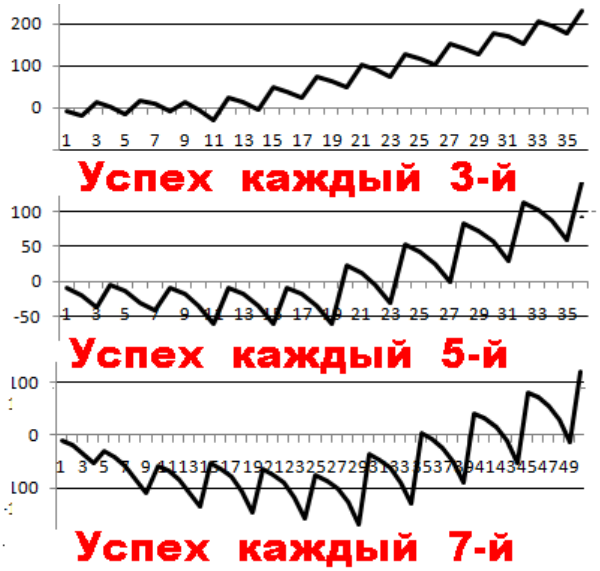
Division of similar events in a row

Modeling processes where
several costs in a row are of passive type
and then 1 success of type of active,

as a result, a growing graph is created,
similar to fractal

and each time wave
is calculated using a logarithm.

Wave includes features:
frequency & amplitude.



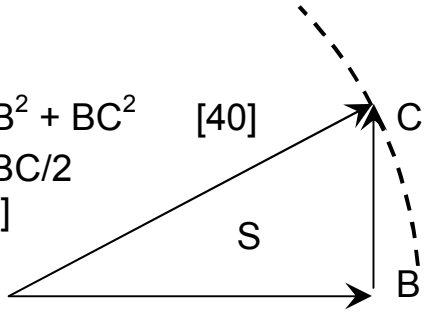
Trigonometry

Sine of angle: ratio of opposite
cathet to hypotenuse sin A = BC/AC [41]

Cosine of angle: ratio of adjacent
cathet to hypotenuse cos A = AB/AC [43]

$AC^2 = AB^2 + BC^2$ [40]

S = AB*BC/2
[42]



Computer calc functions through series including degree & factorial.
Area of triangle is calculated by matrix of coordinates of angles.

Visual Math

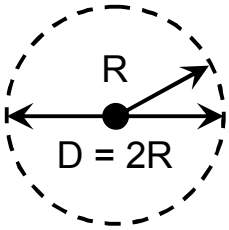
Mathematics

First, studied addition of integer digits.
further addition of integers numbers
further multiplication of integer digits
further multiplication of integers numbers
further addition of non-integer numbers
further multiply of non-integer numbers: integral
further integer powers of integer digits
further integer powers of integers numbers
further integer powers of non-integer numbers
further non-integer powers of non-integer numbers: logarithm.

PI

Circumference $L = 2\pi R = \pi D$ [44]
Area of circle $S = \pi R^2 = \pi D^2/4$ [45]

Ball volume
$V = 4\pi R^3/3$ [46]



e^π > π^e [47]
e^(iπ)=-1 [48]
π = 3,1415926 ~ 3,1416 ~ 355/113

Decision square

Options 2 quantitative and 2 qualitative
create 4 combinations

Example: a transportation problem
creates its own square of solutions.

Solution options:
if an event occurs: what will happen?
if event does not happen: what will happen?
if an event occurs: what will not happen?
if event does not happen: what will not happen?

		МЕДЛЕННО	БЫСТРО
		3	7
ДОРОГО	2	МЕДЛЕННО ДОРОГО 6	БЫСТРО ДОРОГО 14
ДЁШЕВО	8	МЕДЛЕННО ДЁШЕВО 24	БЫСТРО ДЁШЕВО 56

Random in a row

Random graphically include
identical consecutive, distributed
binomial and each greater number
of identical consecutive is 2 times less
than previous one, controlling randomness

KeyWords 27

ours	aliens	others
active	passive	savings
leader	slave	victim
life	machine	language
target	time	control
service	goods	quality
export	exploitation	technology
integral	logarithm	derivative
elite	anti-elite	priority

Knapsack 0-1 binary

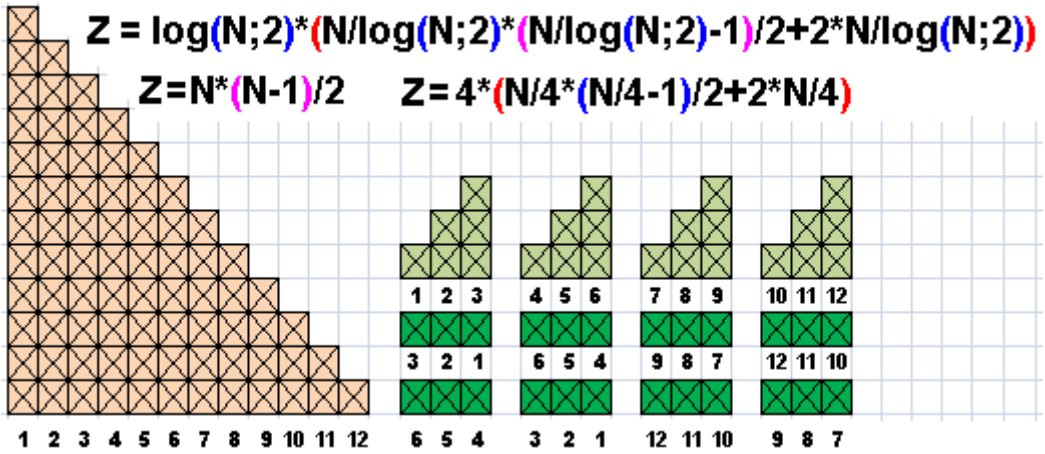
It is required to integrally assemble a set of many items,
having value and mass, limiting maximum mass,
in order to get most value.

Understanding: a thing in a set is either there or not, they are compiled
all possible combinations of N elements in amount =2^N,
for example, with N=5, ciphers from 00000 to 11111 are synthesized
and as a result, most valuable integral set is found.

Algorithm Knapsack 0-1 binary implemented in many languages
programming and is checked through internet by online compilers.

Sorting halves

Considering: array includes elements no more and no less than average,
bubble sorting is converted into several: from 2 to 8 small parts of array sorting
and total sorting is accelerated up to 20 times and recursive algorithm
sorts a million: 1,000,000 elements in 0.3 seconds.



Number of permutations former Z=N*(N-1)/2, decreases and improves to:

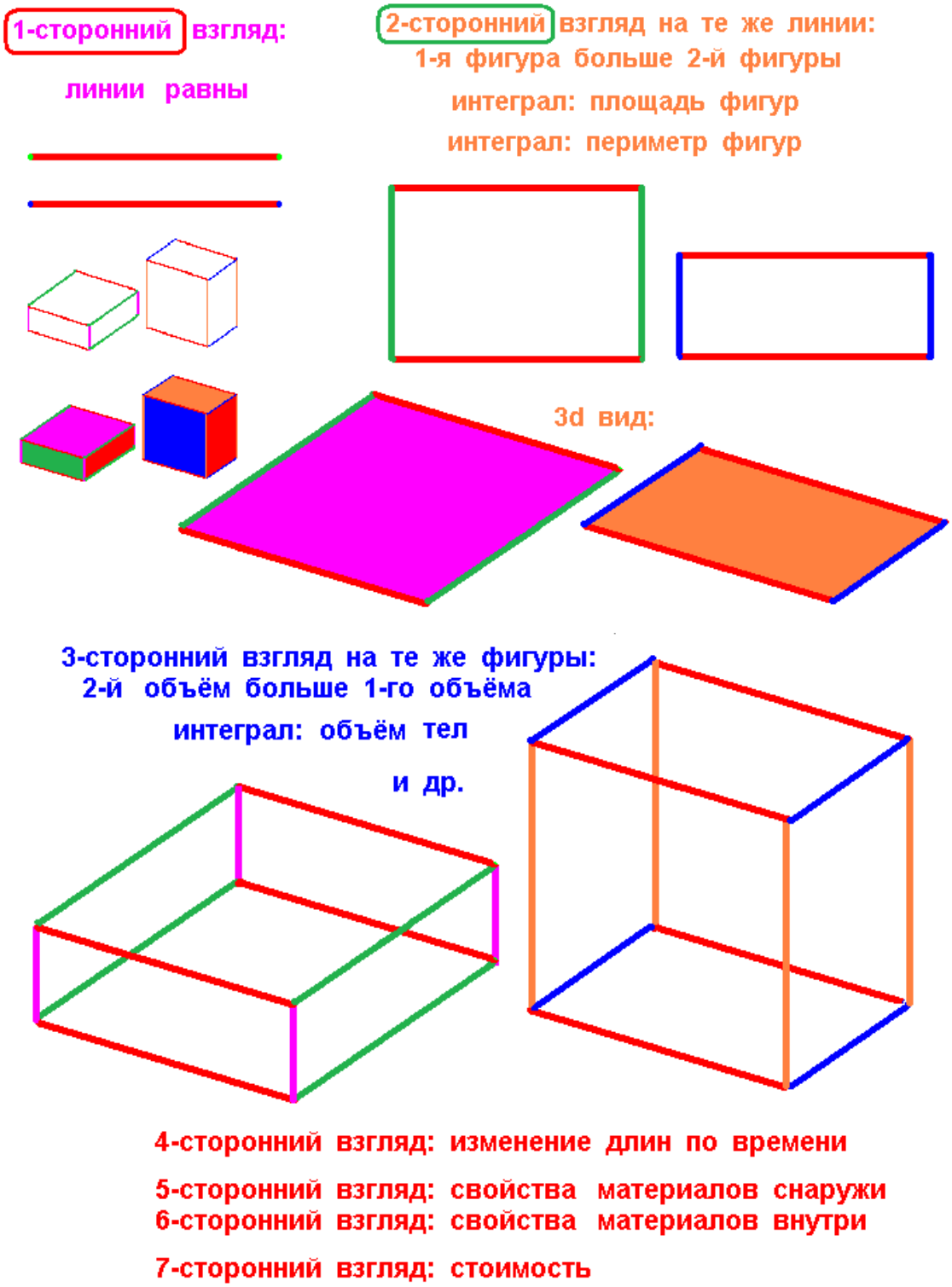
Z = log(N;2)*(N/log(N;2)*(N/log(N;2)-1)/2+2*N/log(N;2)) [49]

Divisibility

Number is divisible by 2	if rightmost digit	is divisible by 2.
Number is divisible by 3	if sum of all digits	is divisible by 3.
Number is divisible by 5	if rightmost digit	is divisible by 5.
Number is divisible by 9	if sum of all digits	is divisible by 9.
Number is divisible by 11	if sum of all digits in even places is equal to sum of all digits in odd places.	

Integral geometrically

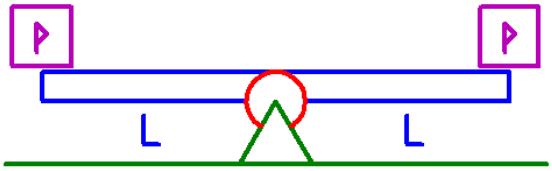
Integral: area of figure between verticals
Integral 2nd: figure area between graphs
integral 3rd: body volume between graphs
Integral N-th: includes qualitative features of mass type.



Visual Math

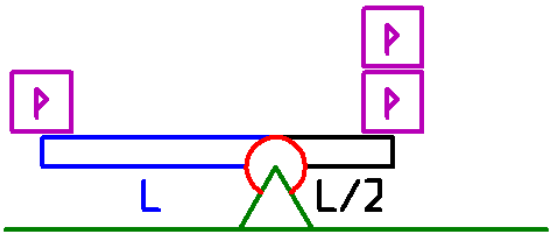
Lever balance

Lever balance is integral each of 2 sides through moment kg*m, equal to product weight P kg on shoulder L m



$$M1=P*L \text{ and } M2 = P*L \qquad [50]$$

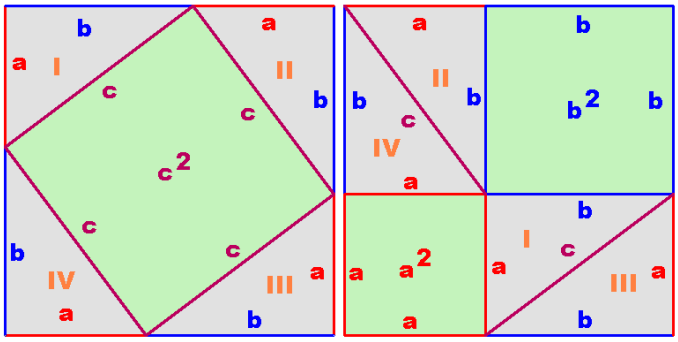
If shoulder L m is reduced in 2 times, having become L/2 m, then balance will create mass 2*P kg in 2 times more



$$P * L = 2*P * L/2 = P * L \qquad [51]$$

Squares

Maximum square $(a+b)^2$ includes c^2 and triangulars I-IV, if rearranged differently,

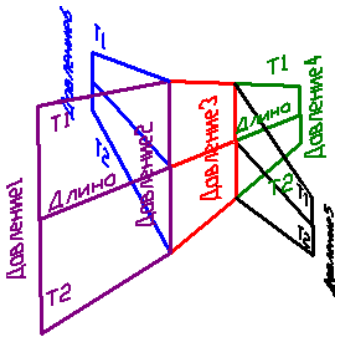


obviously: $a^2 + b^2 = c^2$ [52]

$(a+b)^2 = a^2 + 2ab + b^2$ [53]

Duct section and Pipe diameter

Side of duct channel section d, m, knowing flow rate L, m^3/h and air velocity v, m/s $d = root(L/(v*3600))$ [54]



Diameter d, m, knowing loads Q, Gcal/h and temperature of coolant T1 & T2 °C or flow rate G, m^3/h and setting water density R, kg/m^3 and water velocity v, m/s

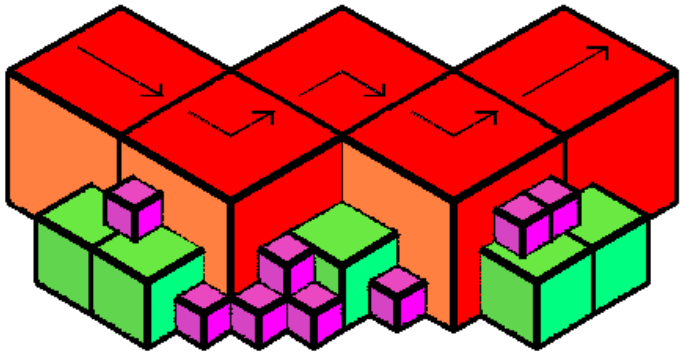
$$G = Q *1000 / (T1-T2) \qquad [55]$$

$$d = 2*root(G/(3,6*R*v*pi())) \qquad [56]$$

Path

Optimal path is chosen as maximum sum of benefit integrals and motion options are compared at each step.

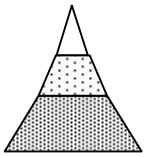
If on a flat field are calculated benefits for each step, then visualization shows volumes: red maxima create optimal path.



Visual Math

Olympic points

Points integrally take into account quantity and quality of medals.
Pyramid of points = gold *3 + silver *2 + bronze [57]
Few countries get highest points and it is possible to unite countries.



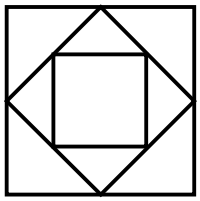
Logic

Deduction: reasoning from general maximum to private minimal individual

Induction: reasoning from particular minimum individual to general maximum

Figure

Draw a figure, pencil from paper without taking it off



Task 1

2 walkers walking towards each other at a distance of 10 km

Speed of 1st walker is 3 km/h.
Speed of 2nd walker is 2 km/h.
From 1st walker, a drone takes off at same height at a speed of 10 km/h.

Drone flies to walking walker and turns back.
Drone flew between walkers all time until walkers met.

Q: How far did drone fly?

Task 2

Airplane is at an altitude of 5000 m.
How much is distance to horizon?

Task 3

Given: 9 balls, 1 of which is lighter.
Determine light ball in 2 weighings.

Task 4

Bottle plastic transparent closed filled with water by about half.

Determine in a second whether there is water of half in bottle
or more than water of half
or less than water of half.

Task 5

Plane flew south for 500 km.
Then plane flew east for 500 km and north for 500 km.
As a result, aircraft returned to its original starting point.

Q: Where did plane start from?
Hint: Solution in hemispheres of North and South.

Task 6

Lliquid level shows horizontal.
Figure out vertical.

Math Solver

mathsolver.microsoft.com/en/solve-problem/C+%7B%60left(1-P%60right)%7D%5E%7BN%7D%3D1

mathsolver.microsoft.com/ru/solve-problem/C-{`left(1-P`right)}^{N}%3D1

$C + (1-P)^N = 1$ НАЙДИТЕ N

$$\begin{cases} N = \log_{1-P}(1-C) \\ N \in \mathrm{R}, \quad N > 0 \end{cases}$$

mathsolver.microsoft.com/en/solve-problem/0.99%2B{`left(1-0.25`right)}^{N}%3D1

mathsolver.microsoft.com/ru/solve-problem/0.99%2B{`left(1-0.25`right)}^{N}%3D1

$0.99 + (1-0.25)^N = 1$ НАЙДИТЕ N

$$N = -2\log_{\frac{3}{4}}(10) \approx 16.008$$

mathsolver.microsoft.com/ru/solve-problem/%60frac%7B%20%20%60left(%20B%2BM%20%60cdot%20%20H%20%20%60right)%20%20%20%20 %7D%7B%20H%2B1%20%20%7D%20%20%20%3D%20%20S

mathsolver.microsoft.com/ru/solve-problem/`frac{%20 `left(B%2BM `cdot%20 H%20 `right)%20%20%20 }{ H%2B1%20 }%20%20 %3D%20 S

$\frac{B+MH}{H+1} = S$ НАЙДИТЕ H

$$\begin{cases} H = \frac{B-S}{S-M}, B \neq M \text{ and } M \neq S \\ H \neq -1, \quad M = S \text{ and } B = M \end{cases}$$

$m = (1 + p \div 100)^y \quad m = \left(\frac{p+100}{100}\right)^y$

$$p = 100m^{\frac{1}{y}} - 100$$

$SolveM = \left(1 + \frac{p}{100}\right)^Y \quad M = \left(\frac{p+100}{100}\right)^Y$

$$Y = \log_{\frac{p+100}{100}}(M)$$

Wolfram Alpha

wolframalpha.com/input/?i=solve+C%2B%281-p%29%5EN%3D1+for+N

C+(1-P)^N=1 solve for N

solve $C + (1 - P)^N = 1$ for N

$N > 0$ and $C = 1$ and $P = 1$

and $\log(1 - P) \neq 0$

and $C < 1$ and $P < 1$

$$N = \frac{\log(1 - C)}{\log(1 - P)}$$

solve for p, c+(1-p)^n=1

solve $c + (1 - p)^n = 1$ for p

$$p = 1 - \sqrt[n]{1 - c}$$

$$c = 1 - (1 - p)^n$$

wolframalpha.com/input/?i=solve+%28B%2BM*H%29%2F%28H%2B1%29%3DS+for+H

solve $\frac{B + M H}{H + 1} = S$ for H

$$H = \frac{S - B}{M - S} \text{ and } M \neq S \text{ and } B \neq M$$

$$H + 1 \neq 0 \text{ and } M = S \text{ and } B = S$$

$$c + (1 - p)^n = 1$$

$$(1 - p)^n = 1 - c$$

$$\ln(1 - p)^n = \ln(1 - c)$$

log(b,z^a) = a·log(b,z)

$$n \ln(1 - p) = \ln(1 - c)$$

$$n = \frac{\ln(1 - c)}{\ln(1 - p)}$$

solve M=(1+p/100)^Y for p

solve $M = \left(1 + \frac{p}{100}\right)^Y$ for p

$$p = 100\left(\sqrt[Y]{M} - 1\right)$$

wolframalpha.com/input/?i=solve+M+%3D+(1%2Bp%2F100)^Y+for+Y

solve M = (1+p/100)^Y for Y

solve $M = \left(1 + \frac{p}{100}\right)^Y$ for Y

$$Y = \frac{\log(M) + 2 i \pi n}{\log\left(\frac{p}{100} + 1\right)}$$

MALmath Android without internet

$$c+(1-p)^n=1 \qquad m=\left(1+\frac{p}{100}\right)^y$$

$$p = 1-(-c+1)^{\frac{1}{n}} \qquad y = \frac{\ln m}{\ln(p+100) - 2\ln 10}$$

PhotoMath

$$0{,}99 + (1 - 0{,}25)^N = 1$$

Решите относительно N

$$N = -2\log_{\frac{3}{4}}(10)$$

$$N \approx 16{,}008$$

$$\mathbf{0{,}99 + (1 - 0{,}25)^N = 1}$$

$$0{,}99 + 0{,}75^N = 1$$

$$0{,}99 + \left(\frac{3}{4}\right)^N = 1$$

$$\log_{\frac{3}{4}}\left(\left(\frac{3}{4}\right)^N\right) = \log_{\frac{3}{4}}(0{,}01)$$

Упростить выражение, используя $\log_a(a^x) = x$

$$N = \log_{\frac{3}{4}}(0{,}01)$$

$$= \log_{\frac{3}{4}}(10^{-2})$$

Mathematica

Mathematica for Windows

```
Solve [Inflat ^ Years == Factor , Inflat]
                  1/Years
    Inflat -> Factor
Solve [ Inflat ^ Years == Factor , Years]
                Log[Factor]
    Years -> ------------
                Log[Inflat]
```

Mathematica for Windows   Danilin

```
In[5]:=    Solve [C+(1-p)^N==1, N]
                 Log[1 - C]
Out[5]=   N -> ------------
                 Log[1 - p]
```

Mathematica for Windows

```
Solve [M == (1+p/100)^Y, Y]
                                             1/Y
          Log[M]                p == -100(1 - M   )
Y == ---------------           Solve
                 p             [M == (1+p/100)^Y, p]
     Log[1 + -----]
                100
```