This chart is currently being worked on...

Math

Geometry

Circle

Rectangle

Triangle

Square

Equilateral Scalene

Ellipse

Combinations

Polygons
lines extending from a point evenly

Quadrilaterals

Right Triangles "Trigonometry"

Phythagorean Theorem

Quadrilaterals

Arithmetic | Basic Math

Operations

Base 10 Counting

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Fraction | Decimal

Layout

Simplify / Reduce

add + subtract −

Multiply × Divide ÷

"Reciprocal" of 1/3 is 3/1

3/1 = 3

25/5 = 5/1 = 5

Categories

Even: divisible by 2
Odd: not divisible by 2
Prime: only divisible by itself or 1
Composite: other dividers

Real Algebraic

Rational

Integer

Natural

Quick Math Strategy

Exponents vs Square Roots

Exponent
$4^2 = 4 \times 4$
$4^3 = 4 \times 4 \times 4$
$4^4 = 4 \times 4 \times 4 \times 4$

Square Root / Log
$\sqrt[2]{4^2} = 4 \times 4$

Cancel out
$\sqrt{x}^2 = x$
$(\sqrt{x})^2 = x$
Multiple same
$\sqrt{3}\sqrt{12} = \sqrt{36}$

elliptical

orbits, cartography

Geometry 3D, 4D, 5D...

Linear Algebra

Lines and Angles

acute, right, obtuse, reflex

parallel

intersect

perpendicular

segment

ray

line

Curve Types

linear — $y=x$ — constant

exponential — $y=a^x$ — chain reactions, bacteria multiplying

logarithmic — $y=\log(x)$ — learning new skill

sine — repeating motion, waves, light, sound

Hyperbolic Curves (Hypotenuse of Sin, Cos, Tan)

Hanging chains, bridges, ropes...

$y = 1/2x$

$y = 3x + 1$

Positive x moves up (left to right)
Negative x moves down (left to right)

× Algebra ×

Add & Subtract parentheses don't matter since gives you same answer

Mult. & Divide parentheses matter? since

crest, amplitude, trough

Audio

Series

Question Types

Combination Permutation

Algebra (equality, inequality)

Slope Algebra

7 less than twice a number is 10
$2x - 7 = 10$

Basic "Equalities"

There 10 eggs in 3 baskets, brown, red and pink.

x Inequalities x

$3x + 7 \geq 13$
$3x \geq 6$
$x \geq 2$

Absolute Value "Always Positive"

More Tricky

How many ways can you make change for 50c using Nickel, Dime, Quarter?

What is the value of 2x?
$10x + 2 = 7$
$10x = 5$
$2X = 1$

Solve
$10x + 2 = 7$
$10x = 5$
$X = 5/10$
$X = 1/2$ or 0.5

An elevator can hold 2,000lbs. Currently at 460.

First Rate (find single unit)

2 points: needed for slope
3 points: needed for growth type (constant?)

there's enough information

What's the cost of each drink?

Average: most common (add all nums then divide by amount of nums)
Mean: middle of data
Mode:
Range:

Calculus (find area under a line, if you know the slope)

Integrate (find area under a line, if you know the slope)

Finds Area under line

when you know the slope

$$\int_{2}^{5} x^2\,dx$$

x end, x start, slope

$yx x^2$ is the slope

what's the area from 2 to 5?

$$\frac{x^3}{3} - \frac{x^3}{3}$$

add 1 to the slope exponent put the exponent underneath, then subtract fraction X by itself. Fill in X coordinates

$$\frac{(5)^3}{3} - \frac{(2)^3}{3}$$

125/3 - 8/3 = 117/3 =
36 is area

Derive (find area under a line, if you know the line)

Finds Slope at any Point

some lines are uneven and don't have a fixed slope

$$\frac{dy}{dx} = \frac{x}{2}$$

Summation

Matrix

Add sub... why useful real life. Just computers?

"Array" [1, 4, 3, 6]

"Multidimensional Array"

1, 5, 3, 6, 4
2, 3, 6, 3, 5

Absolute Value (x) "makes always positive"

Linear

Number Sequence

"Arithmetic" is adding

"Geometric" is multiplying

Ratio Problems?

How many total votes were there? Bob got 6279 votes.

Bob 23%, David 8%, John 24%, Will 11%, Smith 34%

23% : 6279
1% : 1444.17 *divide by 23
100% : 144,417 WRONG
6270 / 0.23 = 27300 CORRECT

Radicals

Rational Expressions (dividing variables)

Euler's Constant

$e = 2.71828...$

Graph theory
Networks
Connections

Parabolas "Quadratics" polynomials FOIL & Factor

Quadratic

Cubic

$y = x^2$

$y = x^3$

Launched a ball from 2 feet
Gravity assist

polynomials FOIL & Factor

$a(x+num)(x+num)=0$ "Factored Form"

$ax^2+bx+c=0$ "Standard Form / Trinomial"

polynomial math

Add & Sub "combine terms"

discriminant "middle of parabola"

Quadratic Formula

Vertex Form

Find vertex/middle (x value)
$x = -b/2a$

Negative

negative x positive = negative

negative x negative = positive

Exponents and Log

Multiply number by itself...
$4^4 = 4 \times 4 \times 4 = 16$
$44 = 4 \times 4 \times 4 \times 4 =$

Factorial
$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

Counting Systems

What is 7% of 800?

A Frog fell in a 30ft hole...

Physics Math

m: mass kg
d: distance (meters)
r: distance from centers. m (meters)
Energy: J (joules)
T: temperature K (Kelvin)

Gravity: G

Light Speed: c

Voltage: Current: electrons/second

Watts Volts Current

Gravity Force

Ele.Mag. Force

Kinematics "motion"

$v = \frac{displacement}{t}$

$a = \frac{v}{t}$

$d = vt$
d "distance"
d "displacement"
v "velocity"
t "time"

$E = mc^2$

$KE = \frac{1}{2}mv^2$

$F = ma$

$Q = m \times Lf$

How much energy to melt 2mg of snow

Patterns

Random(min, max)

Noise(min, max)

Vector(x, y)

control random numbers
Fractals: tree branching
Worley: metal grains, broken glass,
Perlin Noise: sand, dust, dirt,
Simplex:
Gradient: sky,
Idkkkk: bricks,
River: veins, rivers,
Smoke: smoke, cloud

Mandelbrot Set

Procedural Generation

neural network

Functions sigmoid

inputs, hidden layers, wanted outputs

logic

computer processing

variable:

Number Theory

Cryptography

3D Graphics

Functions

Matrix screen

Data Display

Comparison, Rank

Pie

Bar

Spider/Radar

Political

Change

Line

Correlation

Scatter

Relationships / Steps

Tree

Value

Box Plot

Table

Statistics

Combinatorics

Probability

Bell Curve

Mean μ

[Permutations] [Combinations]

How many ways can 4 letters be arranged in 2 slots?

How many ways can 4 letters be chosen?

How many passwords can you make with 4 slots? 26 letters(A-Z)

How many ways can a Coin land on heads

How many passwords can 3 letters in 4 slots make?

How many ways can "ALABAMA" be arranged?

How many ways can "MISSISSIPPI" be arranged?

How many ways can 7 notes be played in a row?

How many ways can 12 notes make a 4 note chord?

Factorial
$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$
$0! = 1$

How many bytes(0,1) can 32bit hold?

$2^{32} = 4{,}294{,}967{,}296$

Algebra Logic test

Order

Every 10 seconds I climb up 5ft then down 2ft. When will I reach 26ft?

Proofs?

Set Theory (Grouping things)

Logic Gates

A = (Russia, UK, USA)
B = (Germany, Italy, Japan)

Size "Cardinality"
|A| = 3
|B| = 3

Order and repeats don't matter
A = (1, 2, 3)
B = (2, 3, 1, 1)
A = B

set builder notation
N = {n | n is even}

A = (1, 2, 3, 4, 5, 6)
B = (2, 4, 5)

A⊆B

B⊆A "B is subset of A"

| such that