Scales & Measurements

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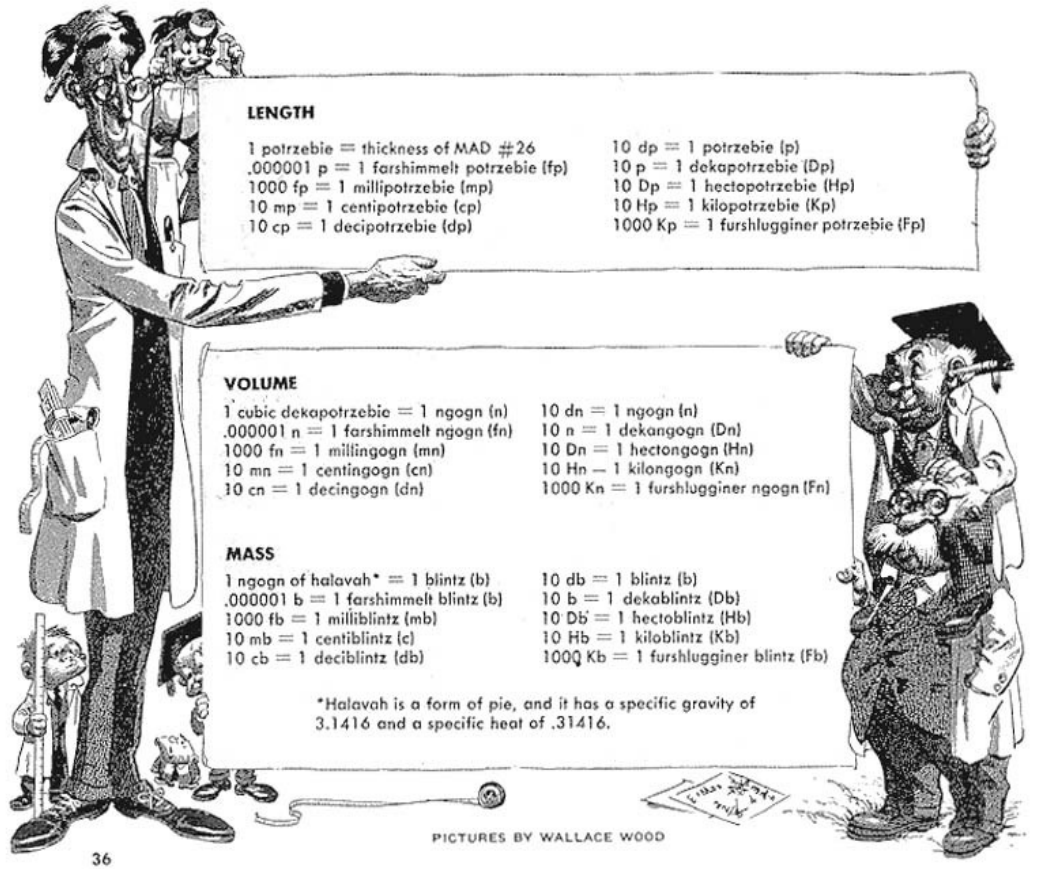
Potrzebie System of Weights &SS Measures

THE POTRZEBIE SYSTEM
OF WEIGHTS AND MEASURES

THE POTRZEBIE SYSTEM

This new system of measuring, which is destined to become the measuring system of the future, has decided improvements over the other systems now in use. It is based upon measurements taken 6-9-12 at the Physics Lab. of Milwaukee Lutheran High School, in Milwaukee, Wis., when the thickness of MAD Magazine #26 was determined to be 2.26334851-7438173216473 mm. This length is the basis for the entire system, and is called one potrzebie of length.

The Potrzebie has also been standardized at 3515.-3502 wave lengths of the red line in the spectrum of cadmium. A partial table of the Potrzebie System, the measuring system of the future, is given below.



LENGTH

1 potrzebie = thickness of MAD #26
.000001 p = 1 farshimmelt potrzebie (fp)
1000 fp = 1 millipotrzebie (mp)
10 mp = 1 centipotrzebie (cp)
10 cp = 1 decipotrzebie (dp)
10 dp = 1 potrzebie (p)
10 p = 1 dekapotrzebie (Dp)
10 Dp = 1 hectopotrzebie (Hp)
10 Hp = 1 kilopotrzebie (Kp)
1000 Kp = 1 furshlugginer potrzebie (Fp)

VOLUME

1 cubic dekapotrzebie = 1 ngogn (n)
.000001 n = 1 farshimmelt ngogn (fn)
1000 fn = 1 millingogn (mn)
10 mn = 1 centingogn (cn)
10 cn = 1 decingogn (dn)
10 dn = 1 ngogn (n)
10 n = 1 dekangogn (Dn)
10 Dn = 1 hectongogn (Hn)
10 Hn = 1 kilongogn (Kn)
1000 Kn = 1 furshlugginer ngogn (Fn)

MASS

1 ngogn of halavah* = 1 blintz (b)
.000001 b = 1 farshimmelt blintz (b)
1000 fb = 1 milliblintz (mb)
10 mb = 1 centiblintz (c)
10 cb = 1 deciblintz (db)
10 db = 1 blintz (b)
10 b = 1 dekablintz (Db)
10 Db = 1 hectoblintz (Hb)
10 Hb = 1 kiloblintz (Kb)
1000 Kb = 1 furshlugginer blintz (Fb)

*Halavah is a form of pie, and it has a specific gravity of 3.1416 and a specific heat of .31416.

PICTURES BY WALLACE WOOD

Terms - 2

- Range - how much is covered (A bigger target has a wider range)
- Granularity - divisions within a unit of measurement (A target with more rings has a higher granularity)
- Precision - how repeatable is the measurement (a group of shots that are closer together is more precise)
- Accuracy - how true is the measurement (A shot group that is closer to the center is more accurate)

Terms - 3

- A target with a lot of rings has higher granularity than one with fewer rings
- A wide cluster of shots centered around the bull's eye is accurate, but not precise
  - The scope is good, but the barrel is loose
- A tight cluster of shots off the bull’s eye is precise, but not accurate.
  - The scope is off center, but the barrel is tight

Terms - 4

- Zero point or origin = a value where the scale starts
- Metric Function = allows meaningful calculations on the scale

$$f(a, b) = 0 \text{ iff } (a=b)$$

$$f(a, b) = f(b, a)$$

$$f(a, b) + f(b, c) >= f(a, c)$$

Nominal Scales -1

- Assigns a name to something
- The name can be a “tag number”, character string or symbol
- No calculations on this scale
- Only operation is equality testing - “Are you Fred Jones?”

Nominal Scales -2

- You can order character strings and tag numbers -- harder to do with pure symbols
- The things measured are individuals, not groups or categories
- Some people do not think this is a scale at all, but it is handy for database designers to do so

Categorical Scales -1

- Assigns a group or set name to something
- The group name can be a “tag number”, character string or symbol
- No calculations on this scale
- Only set operations make sense
  - Membership = Fido is a dog
  - Containment = dogs are mammals
  - Cardinality, Union, Intersection, etc.

Categorical Scales -2

- There are problems when an entity is in more than one category - is a platypus a mammal or not?
- There are problems when an entity is not in any category - How do you classify a Martian?
  - Make a new category
  - Make a Miscellaneous category
  - Exclude it
- Can individual members of the category be determined or not? People versus grains of sand ...

Absolute Scale

- Count the items in the set
- You can add and subtract this scale.
- All elements have to be interchangeable
- There is no ordering within the elements
- There can be special units - dozen, gross, quire, ream, six-pack, etc.
- The empty set is a natural zero point

Ordinal Scales -1

- Puts things in a ordering
- No operations, only comparisons
- No natural zero point or origin
- Example: Moh's scale for the hardness of rocks in Geology:

talc =1 gypsum = 2 calcite = 3

florite = 4 apatite = 5 feldspar = 6

quartz = 7 topaz = 8 sapphire = 9

diamond = 10

Ordinal Scales -2

- It does not follow that this scale is transitive
  - Ever play “scissors, paper, stone”?
- We really want to have transitive scales because they allow us to make predictions, calculations, orderings, etc.

Rank Scales

- Rank scales have an origin
- Units are well-ordered relationships
  - Military ranks are an example
- You cannot do operations on the units;
  - you cannot add 3 Privates to get 1 Sergeant

Interval Scales - 1

- There is a natural ordering of units
- There is no natural origin point
- Some arithmetic operations make sense
  - The unit is uniform in its dimension
- Time is an example
  - Common unit is a day
- There is a metric function

Interval Scales - 2

- The intervals do not have to be the same size
- log-interval scale
  - formulas of the form **$(c * m^d)$**
  - c and d are constants
  - their functions involve logarithms and exponents.
- Examples
  - density = (mass/volume)
  - fuel efficiency = Miles per Gallon (mpg)
  - Sound = decibel scale
  - Earthquakes = Richter scale

Ratio Scales

- This is what most people think a scale is
- The scale has a natural zero or origin point
- The scale is well-ordered
- The unit is uniform in its dimension
- Arithmetic on the units makes sense
- Example: mass, volume, length, etc.

Scale Conversion -1

- Basic rule is that scales must be of the same type to be converted into each other
- Nominal to nominal: a mapping of the names
  - a French to English dictionary
- Ordinal to ordinal: a monotonic function that preserves the same ordering
  - Value of Western and Chinese chess pieces

Scale Conversion -2

- **Rank to rank: a monotonic function that preserves the same ordering: might not be a good match**
  - **Navy to Army ranks**
- **Interval to Interval: linear function which shifts the origin point: should be an exact conversion**
  - **Chinese to CE Calendar**
- **Ratio to ratio: constant multiplier: should be an exact conversion**
  - **Liters to quarts**

Derived Units

- **Derived units are built from Primary units**
  - **Must use Interval and ratio scales because the math must make sense**
- **The result of combining different scales - miles per hour**
- **The result of combining occurrences of the same scale -- square meters**
- **See ISO-2955 for definitions of derived metric units**
- ***In general,* derive these units in a database via calculations and do not store them**

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Summary Chart

Nominal

Categorical

Absolute

Ordinal

Rank

Interval
(Linear
Log)

Ratio

Questions & Answers

?