30.09.2024

An ellipse, anywhere, is given. Have we coordinates, yeah?

But can you count on, say, your cat's cradle not letting you down?

Just space the nodes evenly AFTER showing the matrix it's in.

Balance an elliptical disc between two points on a con-
CAVE down dome: a favour for pants later man:

LIKE SO: The thing would have more energy at the beginning, dampening on the dome's magnetic frequencies, a kind of coin on a mushroom head aftermath of acquisition, or an museum of bonzo, the clown punch bag bouy.

I take notes:
13:34 30-Sept-2024

The copper thing is elliptical in shape, otherwise flat, uniform am I right? No. But I suggest calculation in spite of it.

The weight is 20 mg, the long & short of it: $\frac{3}{5}$, 1 (cm). A point along the long axis and to a distance about $\frac{3}{5}$ cm from the centre of it is in contact with a point the same $\frac{3}{5}$ cm from the apex in true length (it's so special) of a continuous and symmetric dome so that the coin rocks back and forth over it, but what's gonna happen as it goes on rocking? It changes direction, and the peaks of the Potential Energy graph curve for the coin correspond to points which are vertices to some star shape, but if you were to trace the point of contact along the dome from start to finish, what shape is left when I remove the coin? You have a star!

Rough

given an ellipse, find the circle of equal area:

e.g. $a = 5$, $b = 3$ cm

it's $\frac{3}{5}A_1$, where A_1 is the area of a circle of diameter 5. That's $\frac{25}{4}\pi\frac{3}{5}$

$= \frac{15}{20}\pi$

$= \frac{9\pi}{10}$

then radius $= \frac{3}{\sqrt{10}}$ cm

in general:

$\frac{a}{b}(b^2\pi) = ab\pi$

so it's like with rectangles and squares!

If you have a list of material substances and their densities up as far as platinum, but no radioactive stuff on the list, Plot an algorithm to select random combinations, including container weights, but not filling all of them, to make a quota of a certain mass, which is simple enough! The idea is that, lets say you've a few boxes now: $3cm^3$ full of steel, $4cm^3$ full of ice, $20cm^3$ (full) of coal, $2cm^3$ (70%) of gold, and the densities are 7.8, 0.920, 1.2, and 19.3 resp. with containers of planar density $5g/cm^2$ of regular cube shape. Whats the total weight?

$3cm^3 \times 7.8g/cm^3 + 3^2cm^2 \times 6 \times 5g/cm^2 = 23.4g + \overset{270}{\cancel{90}}g_{\cancel{48}} = \overset{29}{\cancel{11}}3.4g$

$4cm^3 \times 0.920g/cm^3 + 4^2cm^2 \times 6 \times 5g/cm^2 = 3,680g + \cancel{120}g = 4\cancel{8}3.680g$

$20cm^3 \times 1.2g/cm^3 + 20^2cm^2 \times 6 \times 5g/cm^2 = 24g + 12Kg$

$\left(\sqrt[3]{2} \sqrt[3]{\frac{100}{70}}\right)^2_{cm^2} \times 6 \times 5g/cm^2 =$

↑

2 is 70% of x in volume

the length of the unfilled cube's side is $\sqrt[3]{\frac{10}{7} \times 2} = \sqrt[3]{\frac{20}{7}}$ which is about the cubed root of 3 or close enough to it about 1.44

$\approx 1.41898412\ldots$

then squared $\times 6 \times 5g/cm^2 = 6.04054177\ldots$

and '+' the material itself $\cancel{2}cm^3$ of gold at $19.3g/cm^3$

$= 38.6g$

5.b total $44.64g$

$\approx \frac{13}{9}$

$13^2 = 169$

$13^3 = 2197$

$9^3 = 729$

maybe around 1.42 then which is very close to $\sqrt{2}$ actually lets have a proper look.

and let's say, the algorithm uses up to 5 containers but may only take one of them as partially filled, and the total must be exactly 12kg of weight, but the volumes may only be discrete integer lengthed cubes.

So in the example, to make it right, how much gold do you really take?

▷ well, you gotta probably change the volume of coal down to 19cm lengthed cube.

altogether:

$2\cancel{9}3.4g + 483.68g + 12,024g + 44.64g$

$= \cancel{833.744g}$

$12845.72g$

$= \underline{12,84572kg}$

: $\sqrt{2} = 1.41421356\ldots$

$\sqrt[3]{3}$

only have $\sqrt{\ }$ function, not $\sqrt[3]{\ }$:

$f(\sqrt[3]{\ }) = f(\sqrt{\ }, {}^2, {}^3, 3)$ that is, f is a combination of roots, squares, cubes and the number 3.

$(\sqrt{2})^3 = 2.828427125\ldots$

and

$\frac{(\sqrt{2})^3}{2} = 1.41421356\ldots$

$1.43^3 \approx 2.924207\ldots$

$1.44^3 \approx 2.985984\ldots$

that's pretty close.

$\sqrt[3]{x^6} = \sqrt[3]{x^3 x^3 x^3}$

$3^{\wedge}(1 \div 3)$

$1.44224957\ldots$ $\sqrt[6]{5} = \sqrt[3]{5} = \sqrt{5}$

$x^6 = x^3 \cdot x^3 = x^2 \cdot x^2 \cdot x^2 = (x^3)^2 = (x^2)^3$

$\left(\frac{13}{9}\right)^3 = 3.013717421$

bit closer!

There was an error: the 3cm volume was written to mean a cube of side length 3cm, so it's actually 27cm³, and that's a lot more!

steel: 243.4g
ice: 483.68g
coal:
$19^3 cm^3$ at $1.2 g/cm^3$:

$= 361$
$\times 19$
$6859 \times 1.2 =$
1371.8 + 6859×576
8230.8g + 2057700g
$= 214000.8g$
$\approx 214kg$

but clearly that's too heavy.

19cm side cube whose capacity is filled by coal at $1.2 g/cm^3$ and whose surface is of planar density $5 g/cm^2$. and I'm aware it's only a rough estimate for surface area (it's only 6 squares 1cm thick of some $5 g/cm^3$ material) instead of $8 \times 1 g/cm^3 + 12 \times n\, g/cm^3 + 6 \times n^2 g/cm^3$ which for $n = 19$ is $8 + 228 + 2166 g = 2402g$
2.402 kg which is about right empty.

but filled with coal is
$19^3 cm^3 \times 1.2 g/cm^3 = 6859$
$\times 1.2$
1371.8
68590
$8230.8g = 8.2308 + 2.402$ kg
$= \underline{10.6328 kg}$

amendment:
$(3cm)^3$ of steel at $7.8 g/cm^3$
is $7.8 \times 27 = 70.2g$
and $3^2 cm^2 \times 6 \times 5 g/cm^2 = 270g$, tot: 340.2g

ice: $64 \times 6 \times 5 = 1920g + 64 \times 0.980 = 64 - 1.28 = 62.72g$

tot: 254.72g

doing the others properly:
steel: $3^3 cm^3 \times 7.8 g/cm^3 = 27 \times 7.8 = 70.2g$
$6 \times 3^2 + 12 \times 3 + 8 = 98g$
tot: $\underline{168.2g}$

ice: $4^3 cm^3 \times 0.980 g/cm^3$
$= 64 \times (1 - \frac{1}{50})$
$= 62.72$
$6 \times 4^2 + 12 \times 4 + 8 = 96 + 48 + 8 = 152g$
tot: $\underline{214.72g}$

but only when the 1cm squares thicken that's correct?? what about the lifting 7 cm?

coal: 10.6328kg

remaining weight:
168.2
+ 214.72
10632.8
11015.72g

You will get exactly 12kg with last gold because 19.3 > 5 for density

so 984.28g left, for gold, so what are the discrete box ways {1, ...} of box:
1: $26 cm^2 \times 5 g/cm^3 = 130g$
2: $(6 \times 4 + 12 \times 2 + 8) \times 5 = 56 \times 5 = 280g$
3: $(6 \times 9 + 12 \times 3 + 8) \times 5 = 98 \times 5 = 490g$

and 494.28g of gold takes up $\frac{494.28}{19.3}$ of volume

$193 \overline{)4942.8} = 25.6$
386
1082.8
965
117.8
115.8
2.0

193 × 5 = 965
193 × 6 = 1158

25.6cm³ which is about $\frac{256}{270}$ of 27cm³

94.8148148...% so it's very nearly filled in this case. well done! about 5g?

$6n^2 + 12n + 8 \quad : \quad 6(n+1)^2 + 2$

$= 6n^2 + 12n + 6 + 2$

$x^3 = 6(x+1)^2 + 2 \Rightarrow x^3 - 6x^2 - 12x - 8 = 0$

x is about 7.8
hmm, that's about steel's density too!

Another example:
get 10 kg of {copper 8.5g/cm³, gold 19.3g/cm³, milk 1.03g/cm³, air 0.001293 g/cm³}
container made of steel 7.8g/cm³.

trying for curiosity just the air:

$(30\text{cm})^3$ @ 7.8g/cm³ = 27000 × 7.8 = 70100g = 70kg 200g

try 1cm³ air so, it's still heavy cause of the containers and we want that gold.
But what if it's important air??
... >sniff< . 2cm³.

$2^3 \times 0.001293 = 0.010344$g

AIR: TOT: 436.810344g

milk: 2^3cm³ × 1.03g/cm³
436.8g container
and 8 × 1.03g/cm³ milk
= 445.04g

~~copper: 3^3cm³ × 8.5g/cm³~~

gold: 4^3cm³ × 19.3g/cm³
= 64 × 19.3 = 7^3cm³:

193
386
772
1544
3088
6176
1235.2g

5^3cm³:
125 × 19.3

6^3cm³:
216 × 19.3
= 19.3
× 216
1158
386
694.8
× 5246
4168.8

7^3cm³:
343 × 19.3
627
1351
237
9457
2297
6619.9g

steel cases:

int:	
1	1: 26 × 7.8 = $13^2 \times 2 \times .6$ = $\frac{6 \cdot 169}{5}$ = 202.8g
8	2: 56 × 7.8 = 436.8g
27	3: 98 × 7.8 = 7.8(100 − 2) = 780 − 15.6 = 764.4g
64	4: 152 × 7.8 = 1185.6g
125	5: 218
216	6: 296
343	7: 384
512	8: 488

152
× 13
1976
23361
11856

5cm container:
218 × 7.8 = 218
18
2834
5236
1700,4

6cm container:
296 × 7.8
296
12 13
3848
5246
2308.8g

8477.6g
6cm cube

~~343 × 7.8~~
384 × 7.5
384
513
4992
5516
2995,2g

So, (7 cm)³ of gold leaves 384.9g for copper left.
then it's 1 cm copper and there's some room left.

: 9615.1g

Well I'm gonna say the challenge failed then. You've to got it exactly or the computer'll beat you.

— Using 6477.6g of the gold container leaves
3522.4g left.

use 436.810344g air can and 445.04g milk can

$= 881.850344$

2640.539656g left for copper. 8.5g/cm³

4cm full: $64 \times 8.5 = 544$g — can: 1185.6g, tot 1729.6g

17, 34, 68, 136, 272,

or 5cm partial: 1700.4g can leaves
940.539656g for the copper

$125 \times 8.5 = 42.5 \times 25$
$= 212.5 \times 5$
$= 1062.5$g so it's 88.5213739...% filled.

and {air, milk, copper gold} in steel:
is {2, 2, (5)@89%, 7}
making 10kg

then what if
you were making
a ball with shells
of different substances,
they'd have to be integer widths.
let's go: gold, steel, copper, aluminum
at ~~en~~ thicknesses: {5, 4, 1, 1}
(or radii increments)

~~its 5cm~~
Vol of sphere is $\frac{4}{3}\pi r^3$ so $\frac{4}{3}\pi(5)^3_{cm^3} \times 19.3_{g/cm^3}$ is $\frac{9650}{3}\pi$g $=$

$\frac{4\pi}{3}(9^3-5^3) \times 7.8 = \frac{4\pi}{3} \cdot \frac{39}{5} \cdot (729-125) = \frac{156}{15}\pi(604)$g

$(10^3-9^3)\frac{4\pi}{3} \times 8.5 = 271 \times \frac{34}{3}\pi$ g

$(11^3-10^3)\frac{4\pi}{3} \times 2.7 = 331 \cdot (3.6)\pi$ g

$\frac{18}{5} \times 331$ ... 156×604: 936, 624, 94224; $271 \times 34 = 9214$

$\pi\left(\frac{9650}{3} + \frac{94224}{15} + \frac{31408}{5}\pi + \frac{9214}{3} + \frac{5958}{5}\right)$

$= \frac{\pi}{15}(48250 + 94224 + 46070 + 29674)$

$= \frac{\pi}{15}(218218)$

$\approx 14547\frac{13}{15}\pi$ g

11cm radius ball of metal with gold in the middle

$(14547\frac{13}{15}) \times \frac{22}{7}$

14547 × 14547 → 160017, 320034

$13 \times 22 = 286$; $15/286 = 19\frac{1}{15}$

$= \frac{160036\frac{1}{15}}{7}$

$320053\frac{1}{15}$

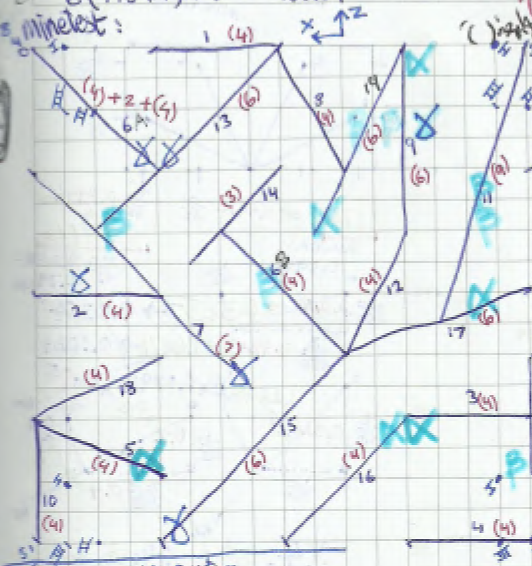
$\boxed{45721\frac{8}{7}\frac{1}{105}\text{g}} \approx \boxed{45.7\text{kg}}$ ~~$= 22862\frac{3}{7}\frac{1}{105}$ g ≈ 23kg~~

$7.8^3 = 474.552$

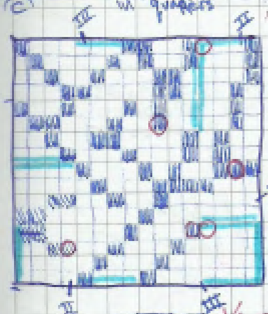
$6(7.8+1)+2 = 466.64$

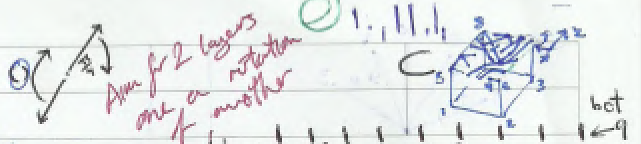
Aim for 2 layers one a rotation of another

minetest:



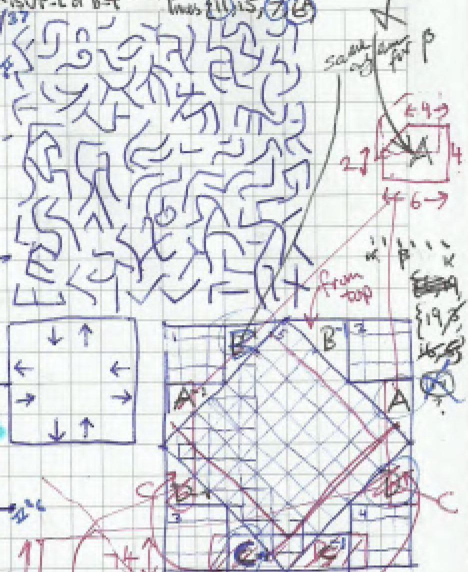
in quarters

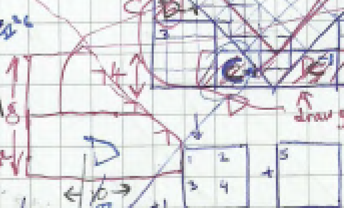




lines {11, 15, 7, 14}

same system for β



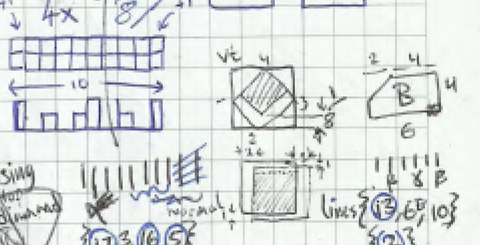


from top

draw grass

If I go in 2 or 3 I have range.

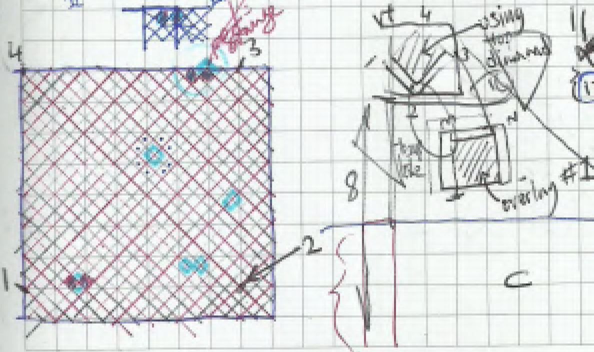
O: lvl 1 white/yellow/orange
14x14 sq on top mid
1st Rot: lvl 2 yellow (but maybe white the same color) bottom right
2nd Rot: lvl 3 bottom mid



{17, 3, 16, 5}

lines {13, 6, 10}
{2}

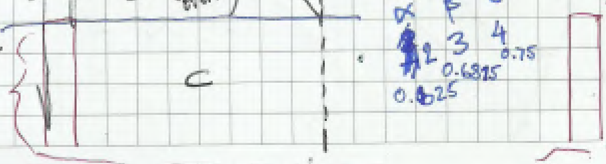
1 Top middle
2



overlay #1

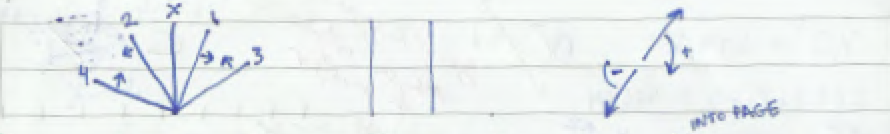
Heights:

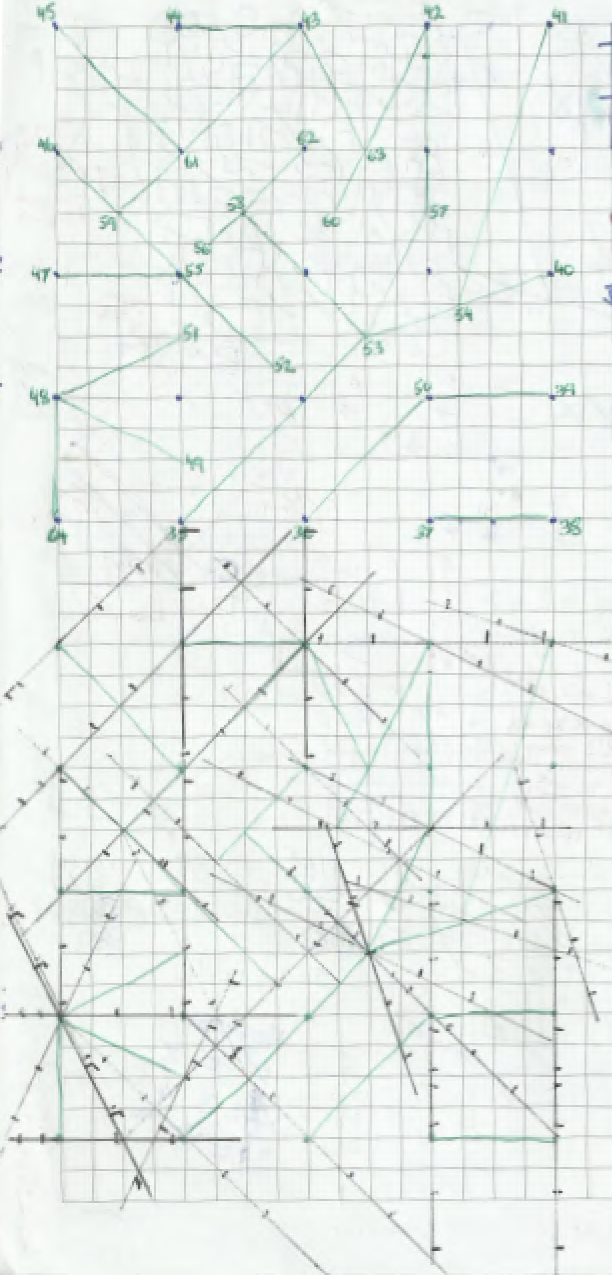
α	β	γ
2	3	4
0.625	0.6875	0.75

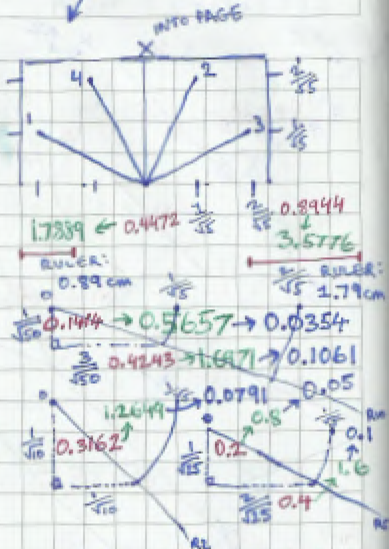


symmetric
9+9

grasses







X4: 16ths ÷4: Standard units

OR JUST SHIFT THE TOP ONES A LITTLE BIT

Hey! looks like a single one'll do fine!

$\frac{1}{\sqrt{10}} \simeq 0.31623$(c.)

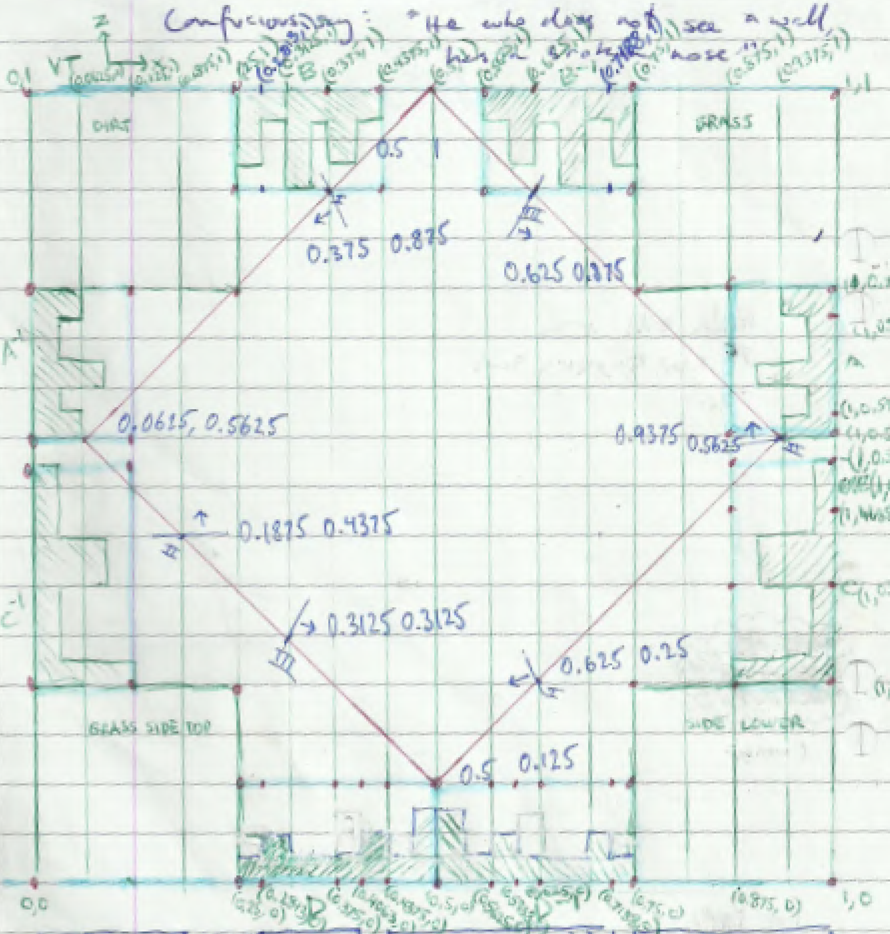
$\frac{3}{\sqrt{10}} \simeq 0.948683$(c.)

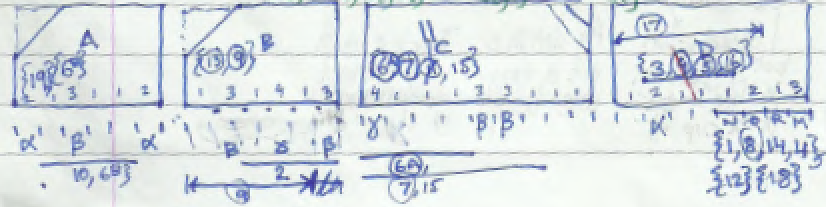
$\left(\frac{1}{\sqrt{10}}\right)^2 + \left(\frac{3}{\sqrt{10}}\right)^2 = 1$

1-OCT-24

Colo photo missing

Confucious say: "He who does not see a well has no nose"





blush.png