Multiplication Arithamagons

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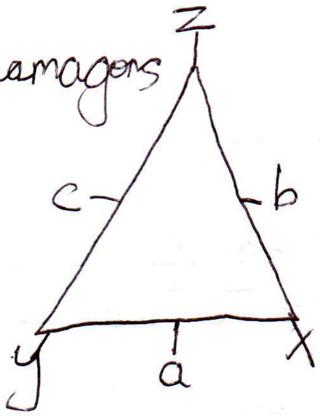
Q1.



The three edge numbers are a,b,c. Choose a pair of factors of a, let $a = xy$. Let us see if one of the factors is common with b, let x be common factor of a and b. Then in the vertex between a and b write x. In the vertex between a and c write y but if y is not a common factor of a,c then pair of factors x,y doesn't work. Then you have to repeat choice of factors of a. If y is common to a, c then write $\frac{c}{y} = z$. if $\frac{b}{x} \neq z$ then the pair of factors x, y does not work. Then you move on to the next pair of factors of a.

Q2. $\frac{\cancel{abc}\,xyz}{\cancel{xyz}\,abc} \; \frac{xyz}{abc} \; \frac{abc}{xyz}$

$= \frac{xy\,xz\,yz}{\cancel{abc}\,xyz}$

$= \frac{x^2y^2z}{xyz}$

$= xyz$

$\therefore$ Product of edge numbers is always the square of product of vertex numbers.

Q3. Case 1: Only edge number changing is a.

a is scaled by a factor of n, $n \in \mathbb{R}$, $n > 0$

The scale by which x and y have to be multiplied has to be the same so that z can compensate for the scaling.

$\therefore$ The square root of x and y is $\sqrt{n}$. This is why n should be possitive

$\therefore$ The scaling of z should be $\frac{1}{\sqrt{n}}$.

Case 2: Only edge numbers changing are a and b.

a and b are scaled by a factor of n each, $n \in \mathbb{R}$, $n > 0$.

y is scaled by a factor of g, $g > 0$.

x is scaled by a factor of k, $k > 0$.

Z is scaled by a factor of i, $i > 0$.

$\therefore gk = n$ — ①

$ki = n$ — ②

$gi = 1$ — ③

① $\div$ ② $\Longrightarrow$

$\frac{g}{i} = 1$ — ④

④ $\times$ ③ $\Longrightarrow$

$g = 1$

$\therefore k = n$

$i = 1$

$\therefore$ ~~Only~~ Only x is scaled by a factor of n.

Case 3: When a, b, c are all scaled by a factor of n
x, y, z all scaled by $\sqrt{n}$

Q4. The only arithamagon possible is

$a, b, c \in \mathbb{Z}$

$y = \frac{1}{n}$, $n > 1$, $x = mn$, $m \in \mathbb{Z}$

$z = ln$, $l \in \mathbb{Z}$