Why one pole = 1?

Any linear relations must satisfy this trigonometric relation.

A drawing of a triangle with colorful writing on it

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Based on the trigonometric rule in this triangle

There must be a specific that will keep this trigonometric relation correct for any Y and X.

And this is because any linear relation will have slope =

And this is the base of linear relation Y =X if N = 1.

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A graph with a line and a green line

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And this for any Natural number N

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Why sin(x) at this shape?

Based on our trigonometric triangle the definition of sin function is

So, the linear relation or ratio must also for sure be kept in this equation as well.

Therefore, we must have some that is making this linear relation correct for any X and Y.

If we have linear relation Y =X and N =1, then we have one unit circle

And this circle will have characteristics of which is a Linear ratio.

Therefore, what the sin function do is keeping this linear relation correct.

And like wise what is Cos function do also keep this linear relation correct nothing more.

This means if we inversed this Sin function for some , we must go back to this linear relation the ratio

A graph of a function

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And this is why the wavelength of the sin and cos function is existed to keep this relation exist at any time with the increase or decrease of X and Y. keeps the ratio there al the time.

So, if our linear relation is X/N then our sin function must have some that will have a wavelength related to this 1/N and will switch its sign at exactly half this wavelength as any linear equation also flip its sign exactly half at origin (0,0).

A graph of a function

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A graph of a line and a curve

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But this relation (sin function) has two points must be kept all the time exists to keep the linear relation exists all time. To match the trigonometric relation in our first graph.

One point at X and another point at X/2

And this keeps the amplitude of the wave sign at 1 for one pole =1. And changing the wavelength to keep the correct linear ratio Y/X.

A graph of a function

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A graph of a function

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And this Y value is the same for any X = N/2

Y = 0.4794255386042 and X = N/2 and this so

A math equation with numbers and symbols

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and this value Y = 0.4794255386042 and X = N/2 exists for any Sin function

then we can use the inverse to get the same ration again Y/X using the inverse of this value

Y = 0.4794255386042 at X = N/2

A graph of a function

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1. To have Y =1 one pole then X must be which means we must have some that can be multiplied by some factor for any X that will keep this property correct for any X.

Therefore, when L = 0.4794255386042

A math equations and numbers

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And this is because at Y =1 then at X =N/2 = ½ then inverse of sin at this specific point will be half the value at X which will be ¼.

Similarly at X =3 the inverse will be 1/6.

A math equations and numbers

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And at X = 7 the inverse will be 1/14

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And at X = 25 the inverse will be 1/50

A math equations and numbers

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A graph with a graph and a line of a function

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A graph of a function

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A graph of function with a line pointing to the end

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