Supplemental: Unit Circle.

Preface: I've learnt about mnemonics like:
TOA CAH SOH previously. However,
I don't feel like the intuition
behind it has been impressed
upon me in a meaningful way.
This is my attempt towards doing
just that.

"You think it's about triangles, but
really... it's about circles."

Without looking it up or using a calculator, given input = 3 (in radians), which statements are ~~[illegible]~~ true?

No.	sin(3)	cos(3)	
1.	0.14	0.99	
2.	0.14	-0.99	← why? why negative?
3.	0.99	0.14	
4.	-0.99	0.14	

Considerations:

- radians = distance of unit circle; walking around.
- cos: measures x-axis wrt unit circle
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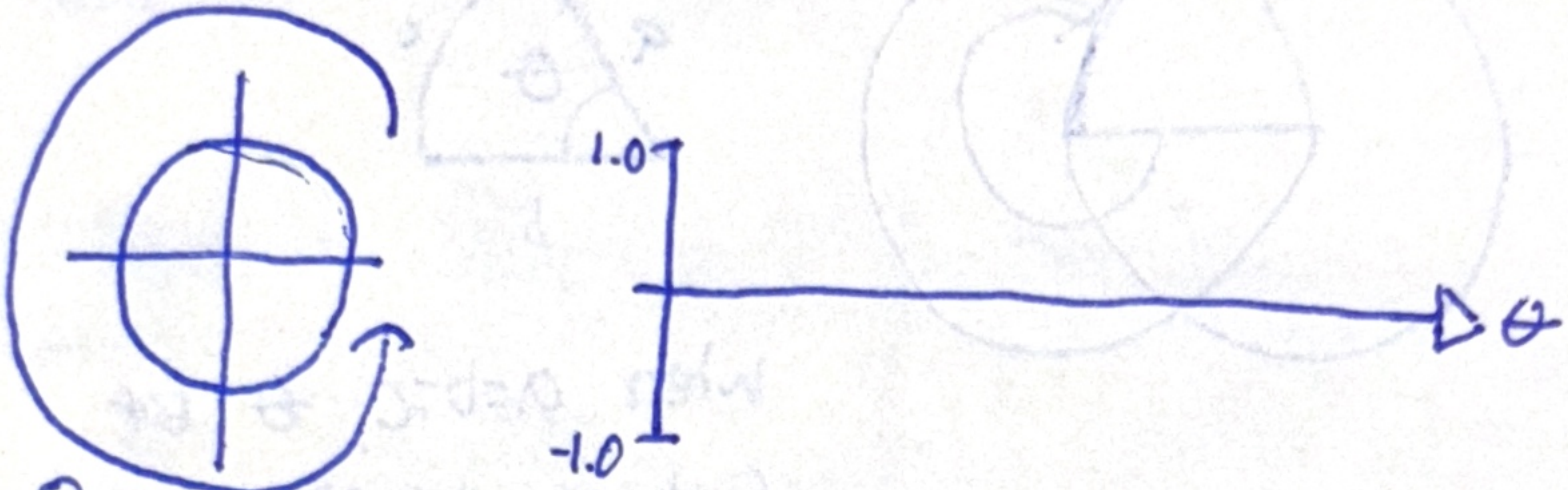
In 3blue1brown's video, he uses 2 visual aids to explain the visual intuition that encompasses sin and cos



① unit circle

② waveform graph

↳ Anti-clockwise

↳ with x-axis

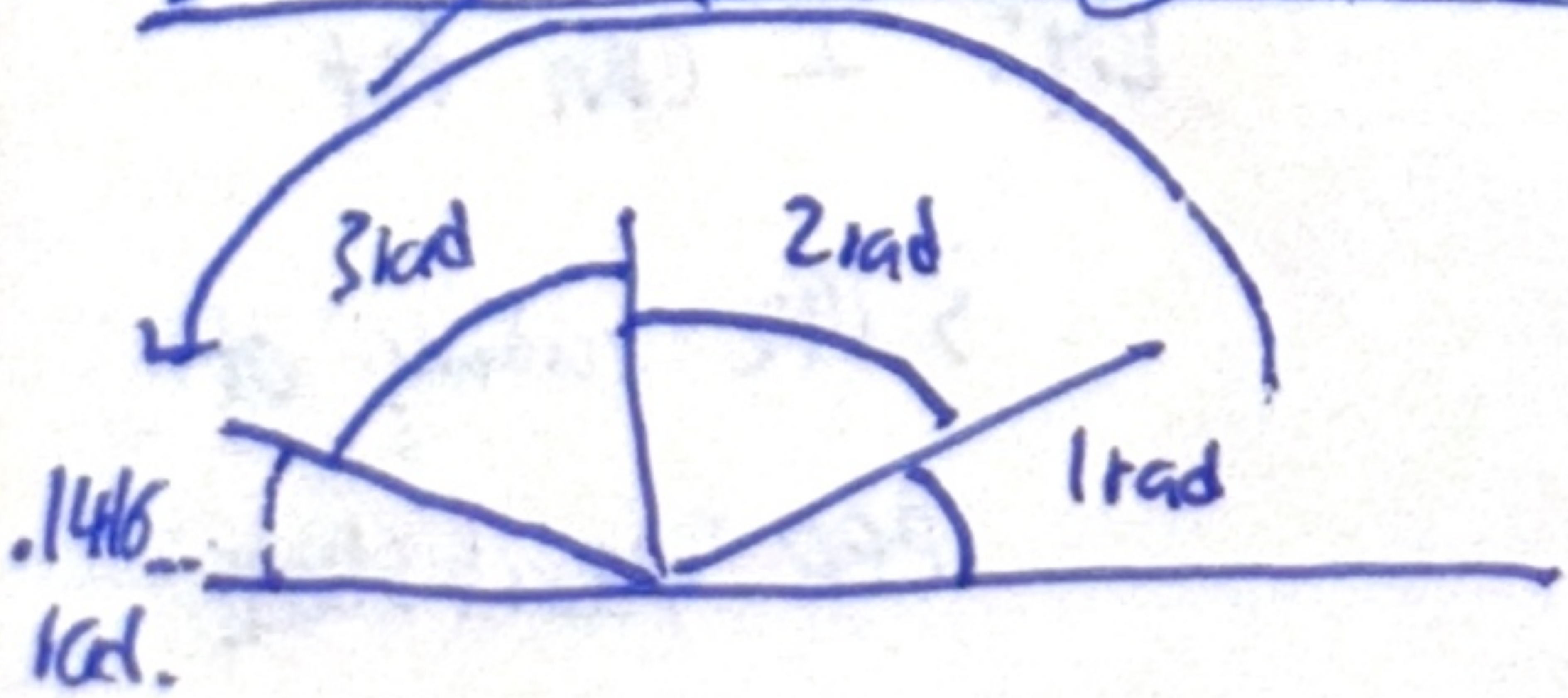
↳ radius no Δ

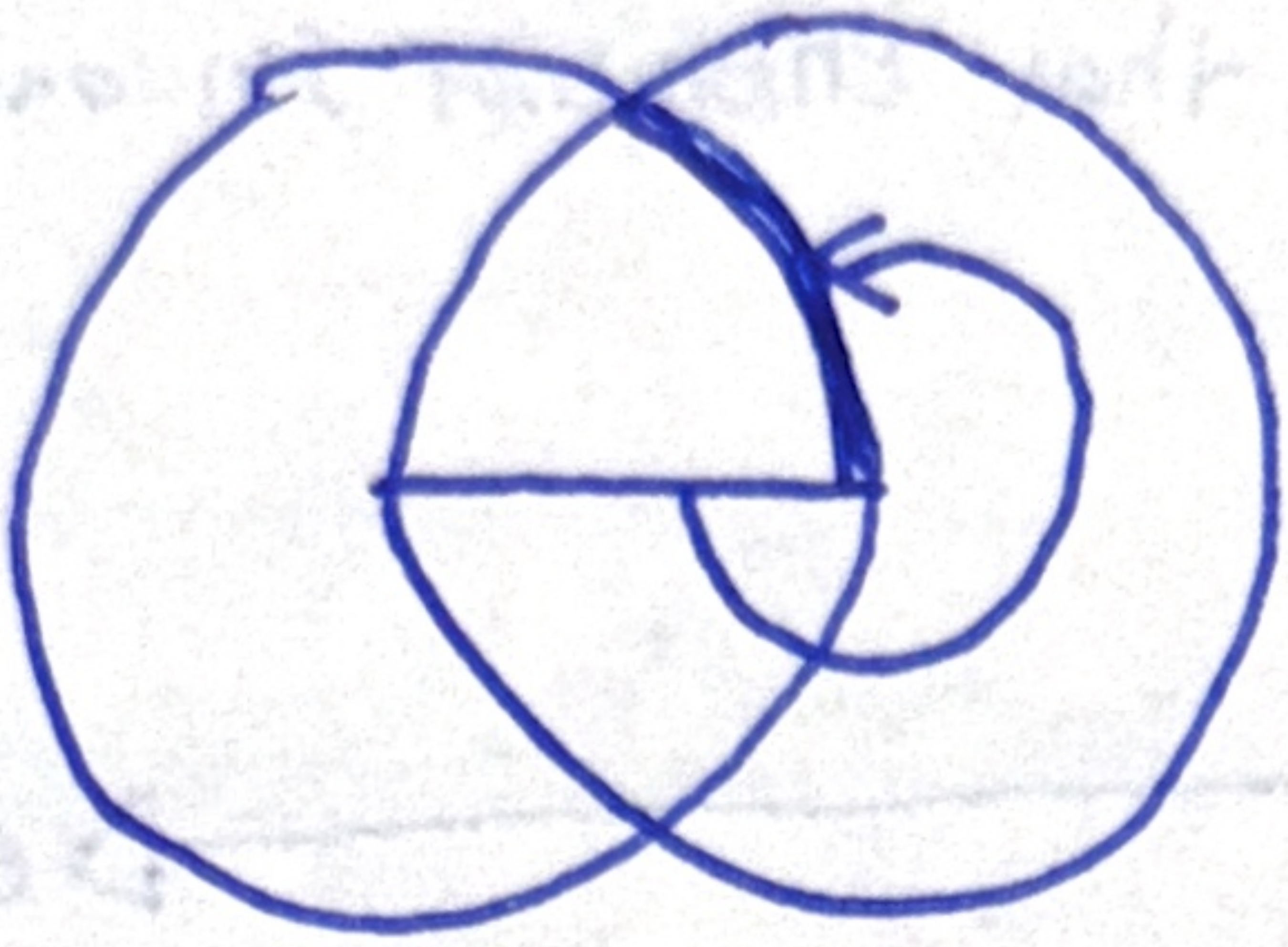
As I look closely into this, the question now is...

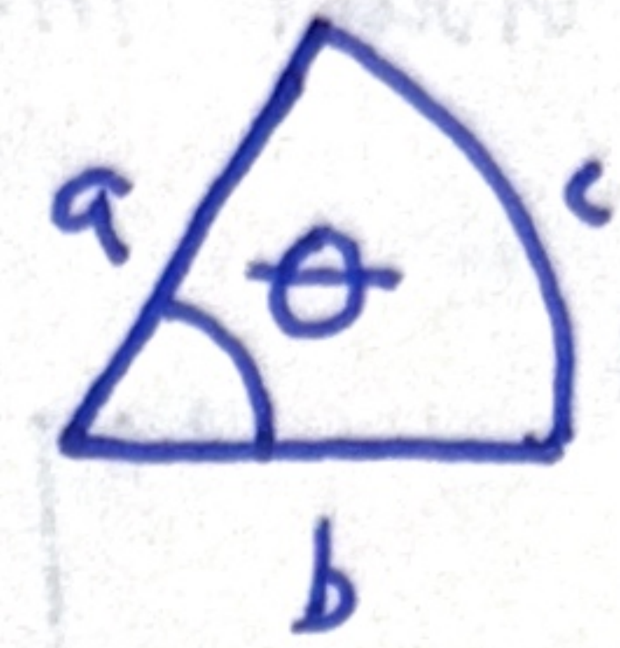
what is radian?

↳ The pure idea of "the radius being laid along the circumference"

A "special" case? A natural case where a slice of a circle very "nicely" has arc length = radius.





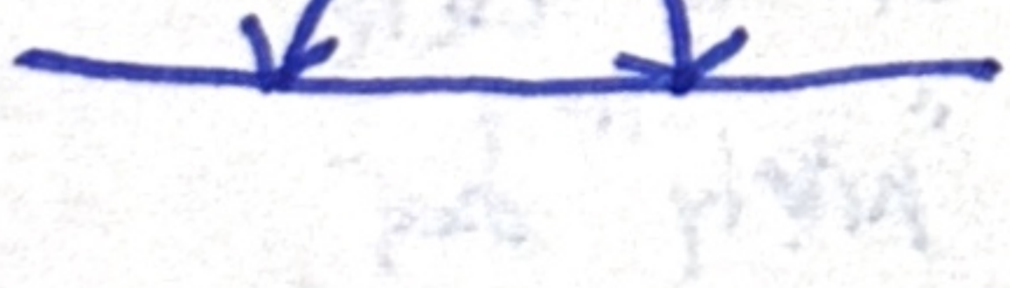


when $a=b=c$, θ for such a "slice", a radian...

refers to the angle for such a "slice"

This is the world of angular representation

180°



≡

refers to the no. of "instances" of such "slices"

This is the world of radian representation, π or 3.142...

Lit: I can fit 3.142 radians of these special slices.

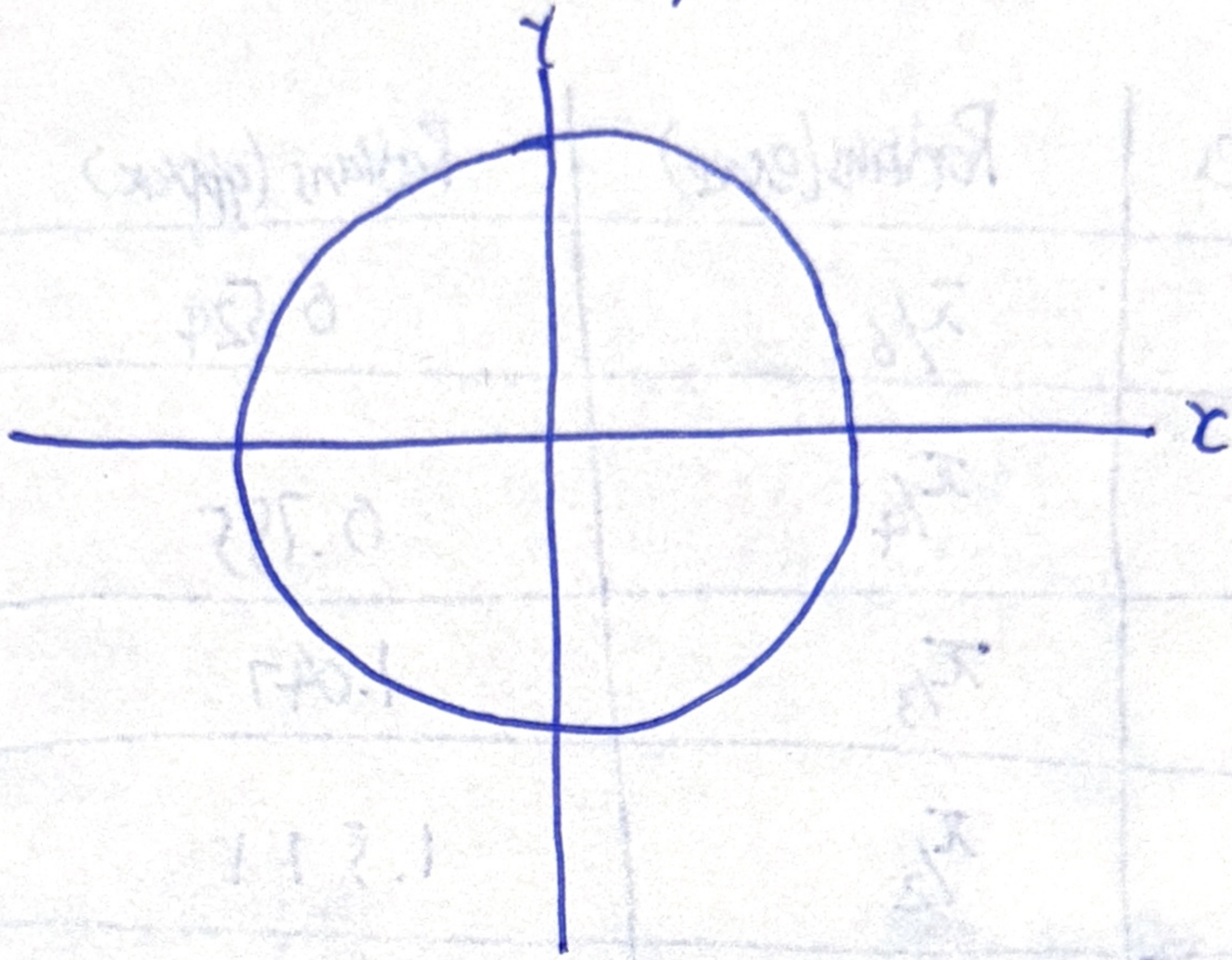
If we take these 2 views into a nice series of discrete points, we get

Degrees	Radians (exact)	Radians (approx)
30	$\pi/6$	0.524
45	$\pi/4$	0.785
60	$\pi/3$	1.047
90	$\pi/2$	1.571
180	π	3.142
270	~~3/4π~~ $\frac{3\pi}{2}$	4.712
360	2π	6.283

denotes relevance

So.... let's look at a unit circle with

Quadrants and Sectors/Regions:



Assumptions:

1. + X-axis as starting point.
2. counter clockwise progression.

what about sine and cosine?

Cosine measures x-coordinates

Sine measures y-coordinates.

Historically, sin came first. The takeaway from this is to just know that sin and cos are to obtain the values of y and x, respectively.

Then, combine this intuition w/ the radial, visual notion of trigonometry, (as opposed to triangular), to identify whether the resultant output of cos and sin functions should be + or - values, depending on the quadrant representation of a unit circle.