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Thread: Tutorial: explaining the math commands

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📄 01-28-2008   #1

zzzdude ○

Wire Amateur
🟩
zzzdude's Avatar
Join Date: Jul 2007
Posts: 58

📄

This tutorial is my first on the forums, although I was planning on having a video tutorial a while ago.
anyways, I will be explaining this as if you can understand the concept of variables and the basics on how to use the expression gate.
I will be explaining how to use various math commands, and explain each command in-depth so you can fully understand it.
Now, if I don't include all of them, please post and let me know.

A math command is a command used in well, math. it acts as part of an equation, such as multiply, and divide.
however, there are other things other than add, subtract, multiply, divide, square root and exponents.

For example, **absolute**
to absolute a variable in reality, you would write it as |x|
however, in programming including the expression gate, it is written as abs(x)
now what abs does is takes X, and makes it positive.
If it is positive, it stays positive, if it is negative, it multiplies by a -1.
example:
abs(7) = 7
abs(-3) = 3
USEFUL FOR:
finding the speed with a given velocity

modulos
Modulos is written as %, but does not mean percentage.
Modulos is actually taught at schools at a young age, when the youth have a problem such as 5/3, they children found out
3 doesn't go into five perfectly, so the REMAINDER is what the teacher would have them right, which is 2.
We all remember remainders in 1st grade, now is the time to apply them.
a little thing about modulos is that you can NEVER get a number that is greater than the number on the bottom.
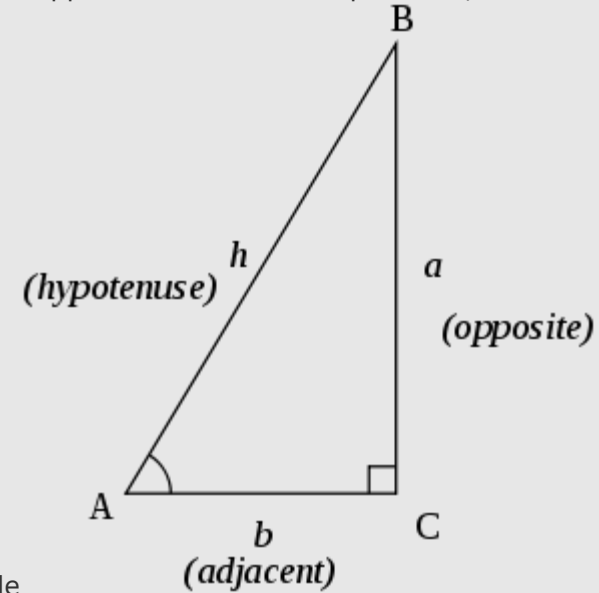example:
147 % 12 = 3

12 goes into 147 twelve times, but there is an amount of 3 left over.

USEFUL FOR: counting in base 256 (bits and bytes and RGB values)

trigonometry
while this subject is taught in school, and appears rather dull and pointless, there is an actual use for it!

this image may be helpful for you people

sine
sine (also known as sin) is a mathematical thing that is used to find ratios of the length of various sides of a triangle, as is cosine and tangent.
sine will give you the ratio of the opposite of the angle that you input over the hypotenuse of the right triangle.
example:
sin A = o/h (refer to pic)

USEFUL FOR: Arcs, circles, spheres, satellites and radars

cosine
cosine is used the same way as sine, but with opposite values (sorta)
instead of a/h, cosine is used for adjacent side over hypotenuse
so
cos A = a/h (refer to pic)

USEFUL FOR: same things as sine

tangent
not as useful as cosine or sine, it is still useful nonetheless.
Tangent = opposite over adjacent
example:
tan A = o/a

USEFUL FOR:
no use found, please post one if you have one

so, a few notes on sine cosine and tangents:
If Z is a constantly increasing value, and X = sin Z with Y = cos Z, you can draw a perfect circle with the outputed coords.
heck, you can draw a cylinder if you use the three variables in a hologram emitter
An easy way to remember the properties of the three: SOH CAH TOA

INVERSE TRIGONOMETRIC FUNCTIONS
ah yes, ATAN, ACOS and ASIN.

i simply love ATAN.
these three are similiar to their partners TAN COS and SIN.

ATAN
this is used to find the angle of a triangle with a given ratio of the two sides of a triangle (adjacent and opposite)
atan(10)=0.46364760

USEFUL FOR:
finding degrees, absolute values only(0-180) orientation can be confusing.
I originally used this for building turrets using GPS coords

ASIN
same as before:
ASIN(o/h) = angle
USEFUL FOR:
finding angles with given side lengths(o/h)
Using distance and Z pos to find the elevation of something, making a turret aim at someones head instead of feet

ACOS
blah
ACOS(a/h) = angle
USEFUL FOR:
finding angles with given side lengths(a/h)
have not used this in wiremod yet, can't think of a reason to do so

ATAN2
this is by far my favourite code ever.
ATAN2(y2-y1,x2-x1) = angle
so you need to find an angle between two points, this is the command you need!
point 1 is the point that is the tip of the angle, the point that the angle is refered to. (x1,y1)
point 2 is where the angle is going to be pointing to. (x2,y2)
simply put those in the atan brackets and Voila`! you got an angle!
this angle is between -180 and +180, but can easily be converted to 360 output

sadly, there is no ASIN2 or ACOS2 that I am aware of...

USEFUL FOR:
finding any angle 😊
turrets with GPS or adv. pod input instead of locator and beacon sensor

angnorm
this changes the angle range of 0-360 to -180 through +180
example:
angnorm(270) = 90

USEFUL FOR:
converting ATAN2 degrees into a 360 degree output

rounding
many kinds of rounding can be considered mathematical, so Ima postin it.

int
this will chop off the decimals of the current variable
example:
int(3.14152659) = 3
this command is very common and hence is included
USEFUL FOR:
rounding the way you were taught to do in elementary school

ceil
this rounds the current decimal'ed fraction up to the nearest whole number
example:
ceil(9.11119) = 10
USEFUL FOR:
countdown clocks

floor
this rounds the current decimal'ed fraction down to the nearest whole number
example:
floor(9.999) = 9
Timed Explosives, clocks, etc.

round
this rounds the input to the nearest whole number
example:
round(5.4) = 5
round (5.5) = 6
you can also set the interval at which it rounds, default is 1
USEFUL FOR:
creating timers that tick at your chosen interval

frac
this does the opposite of int, it cuts off the numbers before the decimal place, and leaves you with the decimals as the value
example:
frac(3.1415) = 0.1415
USEFUL FOR:
not quite sure

sign
not to be confused with sine, sign outputs 1,0, or -1, depending on the number, if it is positive, then output 1, if it is
negative outputs -1, if it is 0, then outputs 0
sgn(56) = 1
sgn(-783) = -1
sgn(0) = 0
USEFUL FOR:
making thrusters thrust with an input of bearing

also as a note; decimal numbers are callled "floats" in programming
well, that's all the time I have to write now, please post comments on improvement which I'll read tomorrow

UPDATED: 2-04-07
added some better examples that can be implemented in garrysmod

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📄 01-28-2008   #2

CowThing ○

Wire Amateur
🟩

CowThing's Avatar

Join Date: Apr 2007
Posts: 45

Good job 😊
I knew most of these, but I did learn a few things. Like the modulos, and some trig stuff.

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📄 01-28-2008   #3

zzzdude ○

Wire Amateur
🟩

zzzdude's Avatar

Join Date: Jul 2007
Posts: 58

Yea, as soon as I learned about ATAN2 I had to share it with the people, but a tutorial just on ATAN2 would be a bit pointless, wouldn't it?

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📄 02-02-2008   #4

miron ○

Wire Sofaking
🟩

Join Date: Apr 2007
Location: California
Posts: 402

🏃🧎

> *... a tutorial just on ATAN2 would be a bit pointless, wouldn't it?[/b]*

Not for me, I suck at this stuff. I knew you could make a circle with sin/cosine, but I didn't know how. So good tutorial, but it could use more examples.
Such as atan. I think I get it, it's like... Ok, had it and lost it. So yeah, a few more examples/how you would use it in-game would be good (like a "so you wire a vectored thruster to an expression with this, if you input this, it does this")

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> 📖 Originally Posted by **Flux**
> *Isnt masturbating a hobby?*

💬 *Reply With Quote*

📄 02-02-2008   #5

Black Phoenix ○

That furred thing

WIREMOD WM DEVELOPER
🟩🟩🟩🟩🟩

ASIN2 and ACOS2 make no sense, because ATAN2 is actually just arctangent of ratio of coordinates you provide, while sine and cosine require angle.

Join Date: Feb 2007
Location: Kyiv, Ukraine
Posts: 3,489

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I'm a wire-crazy person with a tail.

Take a **daily** journey into my brain

D2K5

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02-02-2008   #6

George ○

Wire Amateur

George's Avatar
Join Date: Mar 2007
Posts: 92

Nice, but can we have some examples on how these gates would be used? Nothing worse than a tutorial where it just tells you what each thing is but not how to use it/ examples. Nothing much to learn from it at all 😒

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02-04-2008   #7

zzzdude ○

Wire Amateur

zzzdude's Avatar
Join Date: Jul 2007
Posts: 58

ok, added some better examples, can't really think of some ways to implement things.

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02-05-2008   #8

Pyro-Fire ○

Wire Weeaboo

WIREMOD   **WM HELPER**

Pyro-Fire's Avatar

Join Date:	Aug 2007
Location:	WA, Australia
Posts:	1,804

i thought atan2(A,B) was the same as atan(B/A)

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02-06-2008   #9

zzzdude ○

Wire Amateur

zzzdude's Avatar

Join Date:	Jul 2007
Posts:	58

no, because you can get a division by zero error if you use atan(x/y)

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02-09-2008   #10

Kirk ○

Wire Amateur

Kirk's Avatar

Join Date:	Feb 2008
Location:	The Netherlands
Posts:	60

atan() does not provide the expected result in all quadrants, because the division hides which coordinates have which sign. atan2() adjusts for this, hence why you give in the numbers separately.

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> **Originally Posted by LuaPineapple**
> *WTF does it mean "unable to read int expected int but got int"?*

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