

12.1.44 Editors - Geometry Nodes Editor - Header - Add Menu - Utilities - Math

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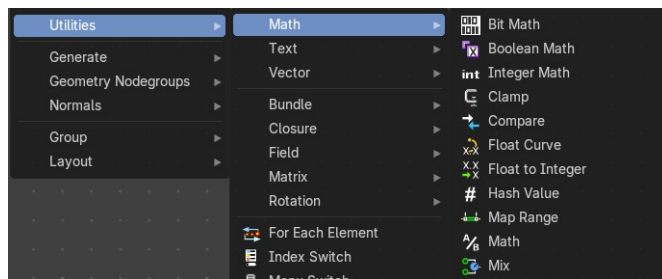
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Add menu - Utilities - Math

Utility nodes are mainly for mathematical operations.



Bit Math

Performs a bit math operation between its inputs.

Inputs

The inputs depends of the chosen method.

Properties

Operation

And

Returns a value where the bits of A and B are both set.

Or

Returns a value where the bits of either A or B are set.

Exclusive Or

Returns a value where only one bit of A and B is set.

Not

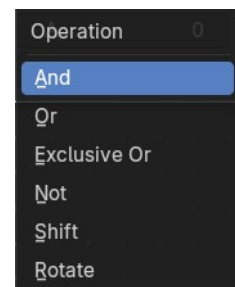
Returns the opposite bit value of A, in decimal it is equivalent of $A = -A - 1$

Shift

Shifts the bit values of A by the specified Shift amount. Positive values shift left, negative values shift right.

Rotate

Rotates the bit values of A by the specified Shift amount. Positive values rotates left, negative values rotates right.



Output

Boolean

Standard Boolean output.

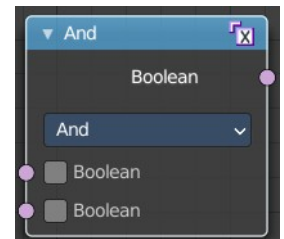
Boolean Math

The Boolean Math node performs a basic logical operation between its inputs.

Inputs

Boolean

Two standard Boolean inputs.



Properties

Operation

And

True if both inputs are true.

Or

True if either or both inputs are true.

Not

True if both inputs are false.

Not And (NAND)

True when at least one input is false.

Nor (NOR)

True when both inputs are false.

Equal (XNOR)

True when both inputs are equal.

Not Equal (XOR)

True when both inputs are different.

Imply (IMPLY)

True unless the first input is true and the second is false.



Subtract (NIMPLY)

True when the first input is true and the second is false.

Output

Boolean

Standard Boolean output.

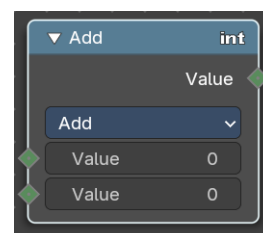
Integer Math

The Boolean Math node provides mathematical operations with integers.

Inputs

Value

Two standard value inputs.



Properties

Functions

The available mathematical functions to manipulate the input integers.

Functions	Comparison	Rounding
Add	Minimum	Divide Round
Subtract	Maximum	Divide Floor
Multiply	Sign	Divide Ceiling
Divide		Floored Modulo
Multiply Add		Modulo
Absolute		Greatest Common Divisor
Negate		Least Common Multiple
Power		

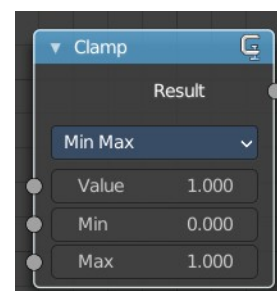
Output

Value

The value output.

Clamp

Clamps a value between a minimum and a maximum.



Inputs

Value

The input value to be clamped.

Min

The minimum value.

Max

The maximum value.

Properties

Clamp Type

Min Max

Clamp values using Min and Max values.



Range

Clamp values between Min and Max range.

Outputs

Result

The input value after clamping.

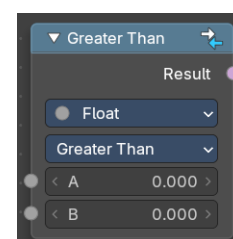
Compare

The Compare node takes two inputs and does a math comparison between them.

Inputs

A, B

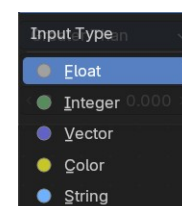
Standard float value input.



Properties

Input Type

What kind of data to compare.



Operation

A is less than B

True if A is smaller than B.

A is lesser than or equal B

True if A is smaller or equal than B.

A is greater than B

True if A is bigger than B.

A is greater than or equal B

True if A is bigger or equal than B.

A is equal B

True if A and B are the same.

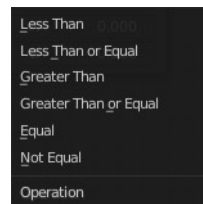
A is not equal B

True if A and B are different.

Output

Result

Standard Boolean output.



Float Curve

The Float Curve node maps an input float to a curve and outputs a float value. This curve can then be used for profiles for example.

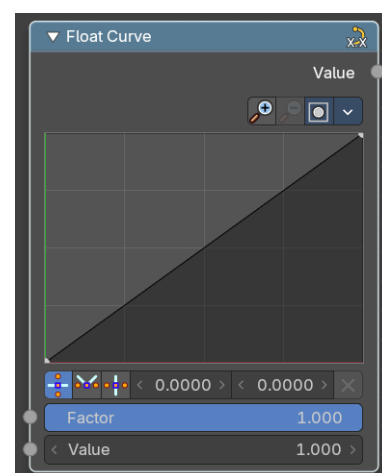
Inputs

Factor

How strong the input influences the output value.

Attribute

The input value.



Properties

Curve Field

Channel buttons

Clicking on one of the channels displays the curve for each.



C (Combined RGB), R (Red), G (Green), B (Blue).

Navigation elements

They are described from left to right.



Zoom in and out

The two buttons with the magnifying glass at it zooms in and out in the curve window.

Clipping Options

Clipping options. Set up clipping for the stroke.



Tools

Tools is a menu where you can find some curve related tools.

Reset View

Resets the curve windows zoom.

Extend horizontal

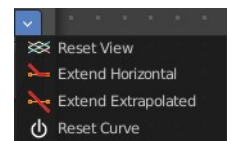
Extends the curve before the first curve point and behind the last curve point horizontally.

Extend extrapolated

Extends the curve before the first curve point and behind the last curve point extrapolated.

Reset Curve

Resets the curve to the initial shape.



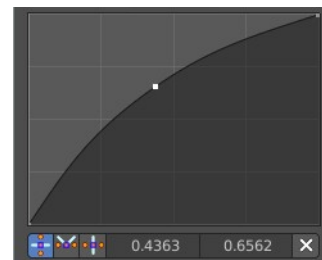
Curve edit field

Create and tweak a Bezier curve that varies the input levels (X axis) to produce an output level (Y axis).

Selecting Points

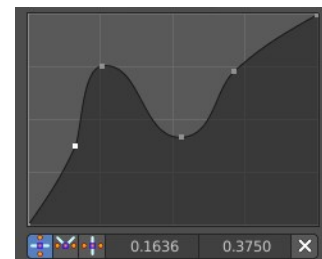
You can select curve points. This reveals two edit boxes for the x and y coordinate of this point.

Selected points can be moved around. Left click at them, hold the mouse button down and move them to a new location.



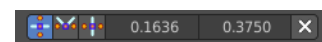
Adding Points

You can add new curve points by simply left clicking at the curve. Move the mouse to position them where you need it.



Curve point settings

When you have a point selected then you will reveal further settings at the bottom.



Vector Handle

Set handle type to Vector.

Auto Handle

Set handle type to Auto.

Auto Clamped Handle

Set handle type to Auto Clamped.

Output

Value

The output value.

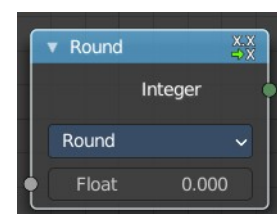
Float to Integer

Converts a floating point value into an integer value.

Inputs

Float

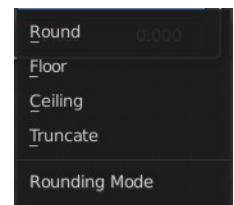
The input float value.



Properties

Rounding Mode

How the float value should be converted.



Outputs

Integer

The output integer value.

Hash Value

The hash value converts a value input into a hashed value.

Note that Hashes cannot be relied upon to be used as unique identifiers because they are not guaranteed to be unique. It can be used to generate somewhat stable randomness especially in cases where White Noise does not offer enough flexibility.



Input

Value

The input value.

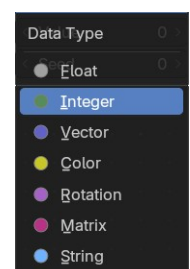
Seed

A seed to randomize the value.

Properties

Data Type

What data type to create.



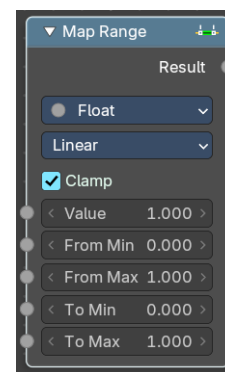
Output

Hash

The hash value output.

Map Range

This node converts (maps) an input value range into a destination range. By default, values outside the specified input range will be proportionally mapped as well. This node is similar to Map Value node but provides a more intuitive way to specify the desired output range.



Inputs

Value

Standard value input.

From Min

Start of the input value range.

From Max

End of the input value range.

To Min

Start of the destination range.

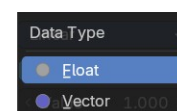
To Max

End of the destination range.

Properties

Data Type

The data type to calculate.

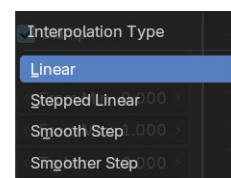


Interpolation Type

how to interpolate the values between min and max.

Clamp

Clamps values to Min/Max of the destination range.



Outputs

Value

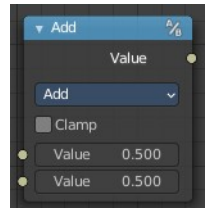
Standard value output.

Math

The Math Node performs math operations.

Inputs

The inputs of the node are dynamic. Some inputs are only available with certain operations. For example, the Addend input is only available in the Multiply Add operator.



Value

Input Value. Trigonometric functions read this value as radians.

Addend

Input Addend.

Base

Input Base.

Exponent

Input Exponent.

Epsilon

Input Epsilon.

Distance

Input Distance.

Min

Input Minimum.

Max

Input Maximum.

Increment

Input Increment.

Scale

Input Scale.

Degrees

Input Degrees.

Radians

Input Radians.

Properties

Operation

The mathematical operator to be applied to the input values:

Functions	Comparison	Rounding	Trigonometric	Conversion
Add	Minimum	Round	Sine	To Radians
Subtract	Maximum	Floor	Cosine	To Degrees
Multiply	Less Than	Ceil	Tangent	
Divide	Greater Than	Truncate	Arcsine	
Multiply Add	Sign	Fraction	Arccosine	
Power	Compare	Modulo	Arctangent	
Logarithm	Smooth Minimum	Wrap	Arctan2	
Square Root	Smooth Maximum	Snap	Hyperbolic Sine	
Inverse Square Root		Ping-pong	Hyperbolic Cosine	
Absolute			Hyperbolic Tangent	
Exponent				

Functions

Add

The sum of the two values.

Subtract

The difference between the two values.

Multiply

The product of the two values.

Divide

The division of the first value by the second value.

Multiply Add

The sum of the product of the two values with Addend.

Power

The Base raised to the power of Exponent.

Logarithm

The log of the value with a Base as its base.

Square Root

The square root of the value.

Inverse Square Root

One divided by the square root of the value.

Absolute

The input value is read with without regard to its sign. This turns negative values into positive values.

Exponent

Raises Euler's number to the power of the value.

Comparison

Minimum

Outputs the smallest of the input values.

Maximum

Outputs the largest of two input values.

Less Than

Outputs 1.0 if the first value is smaller than the second value. Otherwise the output is 0.0.

Greater Than

Outputs 1.0 if the first value is larger than the second value. Otherwise the output is 0.0.

Sign

Extracts the sign of the input value. All positive numbers will output 1.0. All negative numbers will output -1.0. And 0.0 will output 0.0.

Compare

Outputs 1.0 if the difference between the two input values is less than or equal to Epsilon.

Smooth Minimum

Smooth Minimum.

Smooth Maximum

Smooth Maximum.

Rounding

Round

Round the input value to the nearest integer.

Floor

Rounds the input value down to the nearest integer.

Ceil

Rounds the input value up to the nearest integer.

Truncate

Outputs the integer part of the value.

Fraction

Fraction.

Modulo

Outputs the remainder once the first value is divided by the second value.

Wrap

Outputs a value between Min and Max based on the absolute difference between the input value and the nearest integer multiple of Max less than the value.

Snap

Round the input value to down to the nearest integer multiple of Increment.

Ping-pong

The output value is moved between 0.0 and the Scale based on the input value.

Trigonometric

Sine

The Sine of the input value.

Cosine

The Cosine of the input value.

Tangent

The Tangent of the input value.

Arcsine

The Arcsine of the input value.

Arccosine

The Arccosine of the input value.

Arctangent

The Arctangent of the input value.

Arctan2

Outputs the Inverse Tangent of the first value divided by the second value measured in radians.

Hyperbolic Sine

The Hyperbolic Sine of the input value.

Hyperbolic Cosine

The Hyperbolic Cosine of the input value.

Hyperbolic Tangent

The Hyperbolic Tangent of the input value.

Conversion

To Radians

Converts the input from degrees to radians.

To Degrees

Converts the input from radians to degrees.

Clamp

Limits the output to the range (0.0 to 1.0). See Clamp.

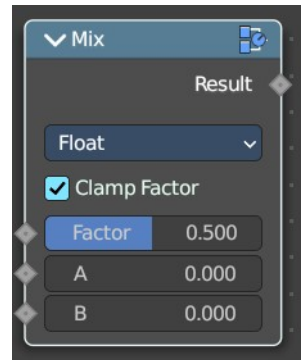
Outputs

Value

Numerical value output.

Mix

Allows to mix values and vectors in various ways. The node has three different modes. Float, Vector and Color. This node covers the Float mode



Input

Float

Factor

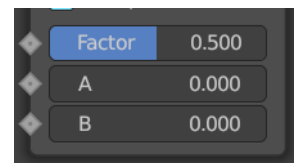
The mix factor.

A

Float value A input.

B

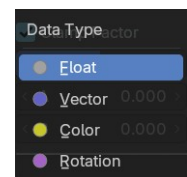
Float value B input.



Properties

Data Type

The data type to calculate.



Output

Result

The output value or vector.