

## 13.1.11 Editors - Shader Editor - Header - Add Menu - Utilities - Vector

### Table of content

Detailed table of content.....	1
Add menu - Utilities - Vector.....	4
Combine XYZ.....	4
Map Range.....	5
Mix Vector.....	6
Separate XYZ.....	8
Mapping.....	8
Normal.....	10
Radial Tiling.....	10
Outputs.....	11
Vector Curves.....	11
Vector Math.....	13
Vector Rotate.....	14
Vector Transform.....	15

## Detailed table of content

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Detailed table of content.....	1
Add menu - Utilities - Vector.....	4
Combine XYZ.....	4
Input.....	4
X Y and Z.....	4
Output.....	4
Color.....	4
Map Range.....	5
Inputs.....	5
Value.....	5
From Min.....	5
From Max.....	5
To Min.....	5
To Max.....	5
Properties.....	5
Interpolation Type.....	5
Linear.....	5
Stepped Linear.....	5
Smooth Step.....	5
Smoother Step.....	5
Clamp.....	5
Outputs.....	5
Result.....	5
Mix Vector.....	6
Input.....	6
Float.....	6

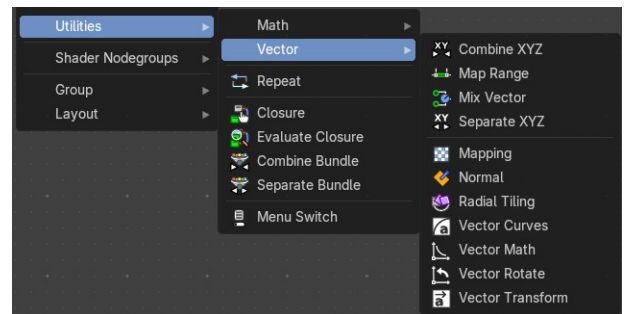
Factor.....	6
A.....	6
B.....	6
Vector.....	6
Factor mode Uniform.....	6
Factor.....	6
A.....	6
B.....	6
Factor mode Non Uniform.....	6
Factor.....	6
A.....	6
B.....	6
Color.....	7
Factor.....	7
A.....	7
B.....	7
Properties.....	7
Data Type.....	7
Float mode.....	7
Clamp Factor.....	7
Vector mode.....	7
Factor mode.....	7
Clamp Factor.....	7
Color mode.....	7
Blending mode.....	7
Clamp Result.....	7
Clamp Factor.....	7
Output.....	8
Result.....	8
Separate XYZ.....	8
Input.....	8
Vector.....	8
Output.....	8
X, Y and Z.....	8
Mapping.....	8
Inputs.....	8
Vector.....	8
Location.....	8
Rotation.....	8
Scale.....	8
Properties.....	9
Vector type.....	9
Point.....	9
Texture.....	9
Vector.....	9
Normal.....	9
Outputs.....	9
Vector.....	9
Normal.....	10
Inputs.....	10
Normal.....	10
Properties.....	10

Normal Direction.....	10
Outputs.....	10
Normal.....	10
Dot.....	10
Radial Tiling.....	10
Inputs.....	10
Vector.....	10
Sides.....	10
Roundness.....	11
Properties.....	11
Normalize.....	11
Outputs.....	11
Segment Coordinates.....	11
Segment ID.....	11
Segment Width.....	11
Segment Rotation.....	11
Vector Curves.....	11
Inputs.....	11
Factor.....	11
Vector.....	11
Channel buttons.....	11
Curve edit field.....	12
Selecting Points.....	12
Adding Points.....	12
Navigation elements.....	12
Zoom in and out.....	12
Clipping.....	12
Tools.....	12
Reset View.....	12
Vector Handle.....	12
Auto Handle.....	12
Auto Clamped Handle.....	12
X / Y.....	13
Delete Points.....	13
Outputs.....	13
Vector.....	13
Vector Math.....	13
Inputs.....	13
Vector.....	13
Vector.....	13
Scale.....	13
Properties.....	13
Operation.....	13
Outputs.....	13
Vector.....	14
Value.....	14
Vector Rotate.....	14
Inputs.....	14
Vector.....	14
Center.....	14
Axis.....	14
Angle.....	14

Properties.....	14
Type.....	14
Invert.....	14
Outputs.....	14
Vector.....	14
Vector Transform.....	15
Inputs.....	15
Vector Input.....	15
Properties.....	15
Type.....	15
Convert From.....	15
Convert To.....	15
Outputs.....	15
Vector Output.....	15

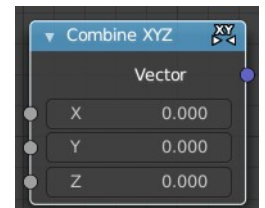
## Add menu - Utilities - Vector

This menu contains nodes that deals with vector data.



### Combine XYZ

Same as with Combine RGB node. It combines color values. But instead combining rgb values, which are in the range of 0 to 255, it uses values in the range from 0 to 1.



### Input

#### ***X Y and Z***

X, Y and Z values.

### Output

#### ***Color***

Color output.

## Map Range

The Map Range node remaps a value from a range to a target range.

### Inputs

#### *Value*

The input value to be remapped.

#### *From Min*

The lower bound of the range to remap from.

#### *From Max*

The higher bound of the range to remap from.

#### *To Min*

The lower bound of the target range.

#### *To Max*

The higher bound of the target range.

### Properties

#### *Interpolation Type*

##### **Linear**

Linear interpolation between From Min and From Max values.

##### **Stepped Linear**

Stepped linear interpolation between From Min and From Max values.

##### **Smooth Step**

Smooth Hermite edge interpolation between From Min and From Max values.

##### **Smoother Step**

Smoother Hermite edge interpolation between From Min and From Max values.

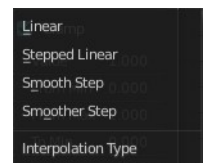
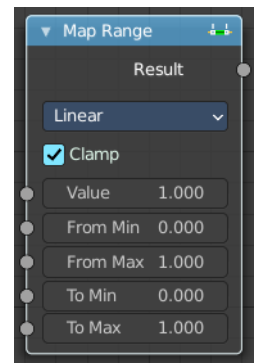
##### **Clamp**

If enabled, the output is clamped to the target range.

### Outputs

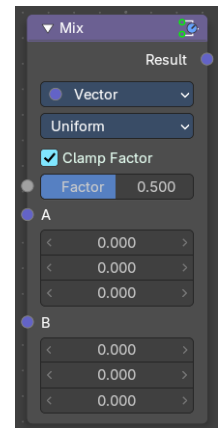
#### *Result*

The input value after remapping.



## Mix Vector

A mix node with vector preselected.



### Input

#### *Float*

##### **Factor**

The mix factor.

##### **A**

Float value A input.

##### **B**

Float value B input.

#### *Vector*

##### **Factor mode Uniform**

##### *Factor*

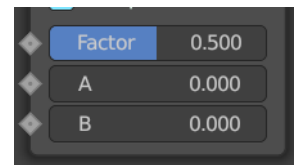
The mix factor.

##### **A**

Vector A input.

##### **B**

Vector B input.



##### **Factor mode Non Uniform**

##### *Factor*

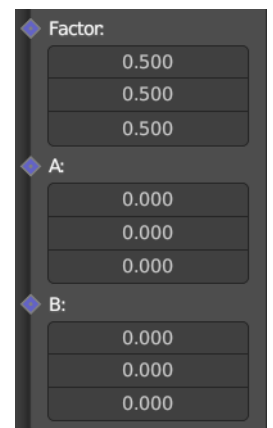
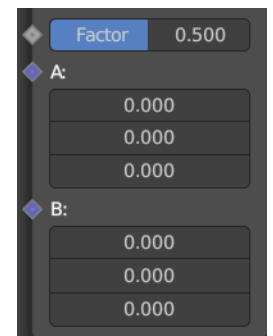
The vector mix factor.

##### **A**

Vector A input.

##### **B**

Vector B input.



## Color

### Factor

The mix factor.



### A

Color A input.

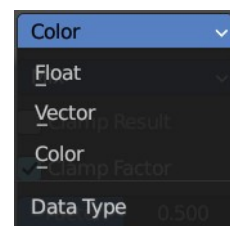
### B

Color B input.

## Properties

### Data Type

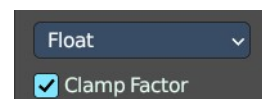
Which mode to use.



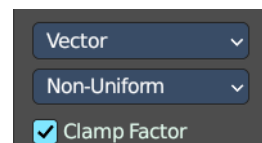
### Float mode

#### Clamp Factor

Clamp the factor to 0-1 range.

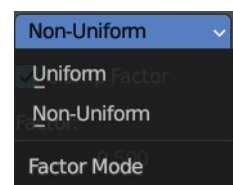


### Vector mode



### Factor mode

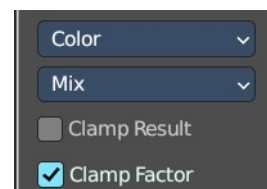
Uniform or non uniform factor.



#### Clamp Factor

Clamp the factor to 0-1 range.

### Color mode



### Blending mode

What blending mode to use for the color.

#### Clamp Result

Clamp the result to 0-1 range.

#### Clamp Factor

Clamp the input factor to 0-1 range.

## Output

### **Result**

The output value or vector.

## Separate XYZ

Same as with Separate RGB node. It separates color values. But instead separating rgb values, which are in the range of 0 to 255, it uses a vector with the values in the range from 0 to 1.

### **Input**

#### **Vector**

The Input vector.

### **Output**

#### **X, Y and Z**

The output vectors for X, Y and Z



## Mapping

The Mapping node transforms the input vector by applying translation, rotation, and scaling.

### **Inputs**

The inputs of the node are dynamic. In particular, the Location input is only available in the Texture and Point vector types.

#### **Vector**

The vector to be transformed.

#### **Location**

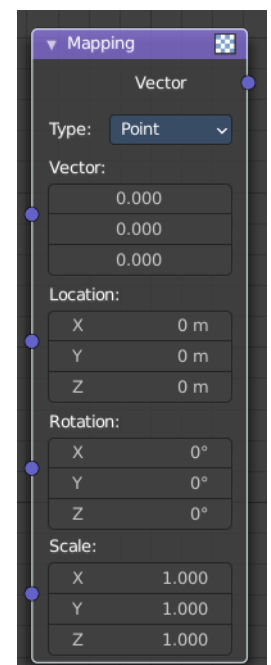
The amount of translation along each axis.

#### **Rotation**

The amount of rotation along each axis. XYZ order.

#### **Scale**

The amount of scaling along each axis.



## Properties

### Vector type

The node applies the transformation differently depending on the semantic type of the input vector.



#### Point

For this vector type, the node performs a straightforward transformation.

Transforming a texture coordinates is analogous to transforming a UV map. For instance, translating the texture coordinates along the positive X axis would result in the evaluated texture to move in the negative X axis, much like if one translated a UV map. Similarly, scaling the texture coordinates up would result in the evaluated texture to scale down. So transforming the texture coordinates would appear to have the opposite effect on the evaluated texture.

The order of transformation is: Scale → Rotate → Translate, which means:

Translation moves the input along the local rotation axis.

Rotation rotates the input around the origin of the space.

Scaling scales the input along the global axis.

#### Texture

For this vector type, the node performs an inverse transformation.

Inverse transforming a texture coordinates would, as opposed to the Point type, transform the evaluated texture itself. For instance, translating the texture coordinates along the positive X axis would result in the evaluated texture to move in the positive X axis, as one would expected. Similarly, scaling the texture coordinates up would result in the evaluated texture to scale up, as one would expect.

The order of transformation is: Translate → Rotate → Scale, which means:

Translation moves the input along the global axis.

Rotation rotates the input around the translation vector.

Scaling scales the input along the local rotation axis.

#### Vector

For this vector type, a Point transformation is performed, but with zero translation.

#### Normal

For this vector type, the node performs the inverse transpose of the transformation and normalize the result. Such transformation ensures correct normals after non-uniform scaling. So this type should be used when transforming normals.

## Outputs

### Vector

The input vector after transformation.

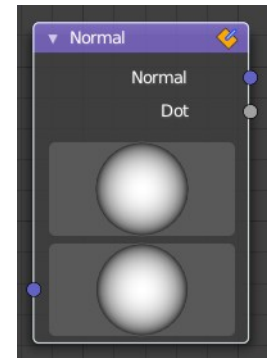
## Normal

The Normal node generates a normal vector and a dot product.

### Inputs

#### *Normal*

Normal vector input.



### Properties

#### *Normal Direction*

To manually set a fixed normal direction vector. LMB click and drag on the sphere to set the direction of the normal. Holding Ctrl while dragging snaps to 45 degree rotation increments.

### Outputs

#### *Normal*

Normal vector output.

#### *Dot*

Dot product output. The dot product is a scalar value.

If two normals are pointing in the same direction the dot product is 1.

If they are perpendicular the dot product is zero (0).

If they are anti parallel (facing directly away from each other) the dot product is -1.

## Radial Tiling

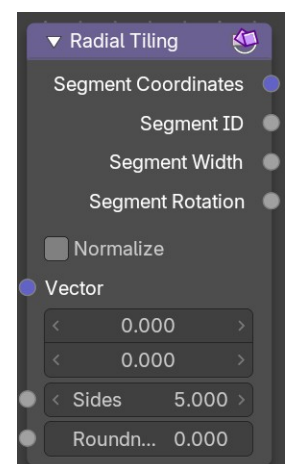
### Inputs

#### *Vector*

Input vector.

#### *Sides*

Number of angular elements for tiling.



## **Roundness**

Roundness of the segment coordinate system.

## **Properties**

### **Normalize**

Normalize the output to a 0/1 range.

## **Outputs**

### **Segment Coordinates**

Segment coordinates for texture mapping.

### **Segment ID**

Unique ID for every segment.

### **Segment Width**

The width of each segment.

### **Segment Rotation**

The rotation of each segment.

---

## **Vector Curves**

The Vector Curves node maps an input vector components to a curve.

### **Inputs**

In the shader context the node also has an additional Factor property.

### **Factor**

Controls the amount of influence the node exerts on the output vector.

### **Vector**

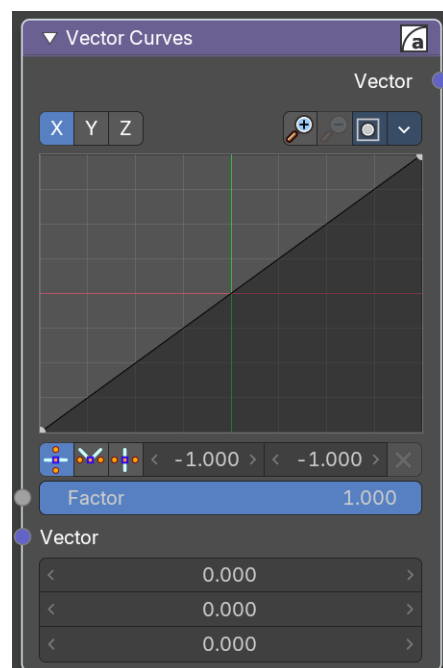
Standard vector input.

Properties

Channel

### **Channel buttons**

X, Y, Z. Clicking on one of the channels displays the curve for each.



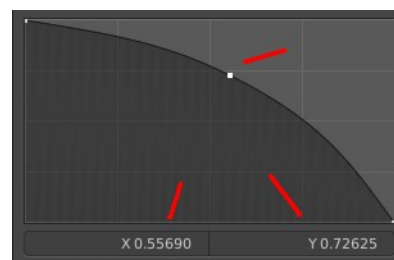
## Curve edit field

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

### Selecting Points

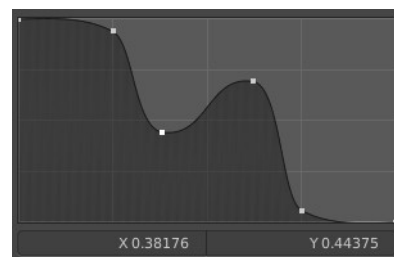
You can select curve points. This reveals two edit boxes for the x and y coordinate of this point.

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.



### Navigation elements

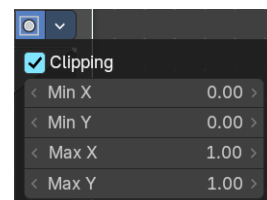
The navigation elements at the top are described from left to right.

### Zoom in and out

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

## Clipping

Clipping options.

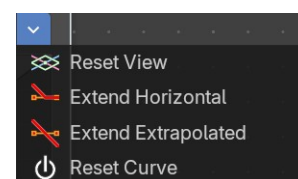


## Tools

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

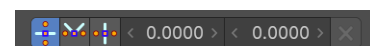
### Reset View

Resets the curve windows zoom.



### Vector Handle

Set handle type to Vector.



### Auto Handle

Set handle type to Auto.

### Auto Clamped Handle

Set handle type to Auto Clamped.

## X / Y

The x and y position of the currently selected curve point.

## Delete Points

Delete the currently selected curve point.

## Outputs

### Vector

Standard vector output.

## Vector Math

The Vector Math node performs the selected math operation on the input vectors.

### Inputs

The inputs of the node are dynamic. Some inputs are only available in certain operations. For instance, the Scale input is only available in the Scale operator.

### Vector

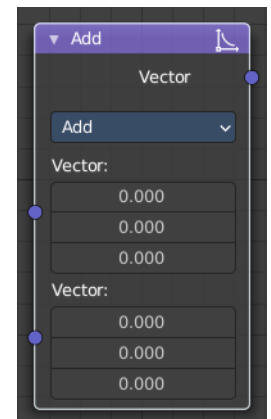
Input vector A.

### Vector

Input vector B.

### Scale

Input Scale.



## Properties

### Operation

The vector math operator to be applied on the input vectors.



## Outputs

The output of the node is dynamic. It is either a vector or a scalar depending on the operator. For instance, the Length operator have a scalar output while the Add operator have a vector output.

## **Vector**

Output vector.

## **Value**

Output value.

## **Vector Rotate**

This node provides the ability to rotate a vector around a center point using either Axis Angle, Single Axis or Euler methods.

### **Inputs**

#### **Vector**

The input vector.

#### **Center**

The center for the rotation.

#### **Axis**

The axis angles.

#### **Angle**

The rotation angle.

### **Properties**

#### **Type**

The rotation type.

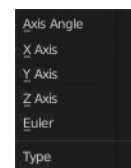
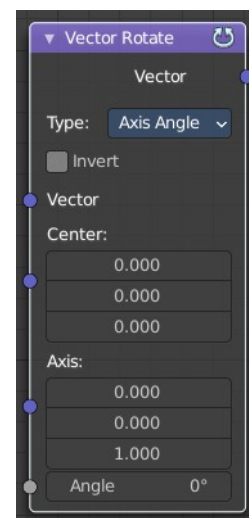
#### **Invert**

Invert the angle

### **Outputs**

#### **Vector**

The output vector



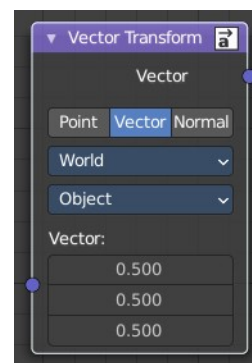
## Vector Transform

The Vector Transform node allows converting a vector, point, or normal between world and camera and object coordinate space.

### Inputs

#### *Vector Input*

Standard vector input.



### Properties

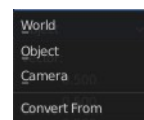
#### *Type*

Specifies the input/output type.

Vector, Point, Normal.

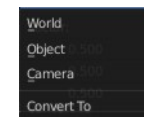
#### *Convert From*

Coordinate Space to convert from World, Object or Camera.



#### *Convert To*

Coordinate Space to convert to World, Object or Camera.



### Outputs

#### *Vector Output*

The transformed output vector.