# Nodes

## Creating a Line
- Select *New.* Switch to *Artwork Canvas*.
- Select the *Pen* tool and draw a few lines.
  - A left click with the release of the mouse; then a drag and click will form a straight line.
  - A left click and drag while holding the mouse will allow you to shape the line as you create it.
  - To end the line and select it, press the space bar.

## Types of Nodes
- *Straight or Line Nodes:*
  - These nodes have a straight line before and after the nodes.
  - This type is formed with a left click.
- *Cusp Nodes*:
  - These nodes let you create corners or sharp angles like a straight node, but each side maintains its own characteristic.
  - You can move the control handles independently of one another to change the line only on one side of the node.
- *Smooth Nodes:*
  - These nodes create smooth transitions between the line segments.
  - The control handles are directly opposite from each other.
  - The control handles can be different distances from the node.
- *Symmetrical Nodes:*
  - These nodes let you create smooth lines like the smooth node.
  - They will give the line on each side of the node the same curve appearance. These handles move in unison.
  - The control handles are directly opposite each other and are at an equal distance from one another.
- Between each node is a segment—these segments can be curved or straight.
- Control handles are positioned on the node and become visible when you select *Reshape Vector Object*.

## Selecting & Editing Nodes
- To edit a node, select *Reshape Vector Object*.
- You can add, delete, join, break apart nodes; change from straight to curved or curved to shape; or change the type of node.
- One node, multiple nodes, or all nodes can be selected to edit.
- To select all nodes, click on *Select All Nodes*.
- To select only one node, click on the node.
- To select multiple nodes, hold the *Shift key* and click on the nodes you wish to select or marquee select by drawing a bounding box around the nodes you wish to select.
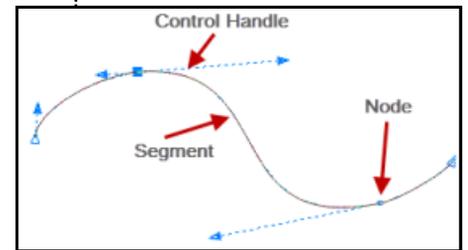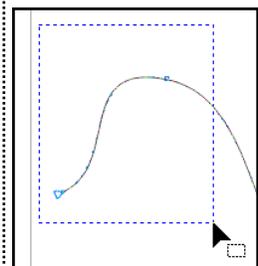
## Moving Nodes
- Select the drawn line and select *Reshape Vector Object*.
- Select the starting node of your line.
- Click and drag to move it around. This will change the length of the line segment and its position.
- Hold the *Shift* key and select the second node of your line.
- Move your cursor. This moves both nodes.
- When you have two nodes selected, the segment in between the nodes remains the same, while adjacent line segments are re-shaped.

## Adding Nodes
- Click on a portion of the line that has no node. A small black star appears.
- Click on *Add Node* in the *Property bar* and a node will be added.
- You may also add a node by double clicking on the line.
- To add a node in the exact center of a line segment, select an existing node and click on the *Add Node* icon. The new node is added centered between the selected node and the next node toward the beginning of the line.

## Deleting Nodes
- Double click on a node to delete it.
- You may also select a node by clicking on it and then select *Delete Node.*

## Changing the Type of Node
- Select a node in between curved line segments.
- Click on *Cusp Node*. The node changes to a cusp node.
- Further editing can be done to this node by moving the control handles .
- By moving the control handles, you can form a right angle point.
- Click on *Smooth Node* while the node is still selected to change the node back to a smooth node.
- Click on *Symmetrical Node* to give the node equal control handles. These nodes make smoother curves.

## Rotating & Rescaling Nodes
- Select a node.
- Select *Rotate/Skew Nodes.*
- Handles appear around the node and can now be rotated or skewed.
- Select a node.
- Select *Stretch/Scale Nodes*.
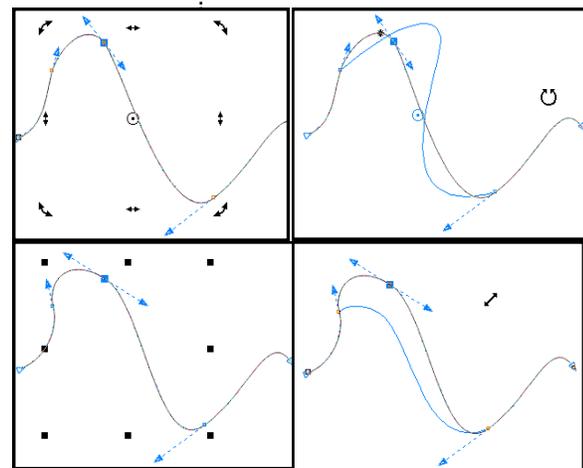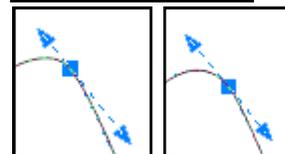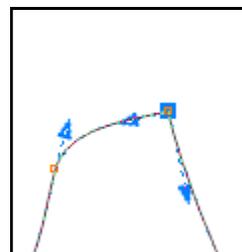- Handles appear around the node and can now be scaled.

*Notes:*
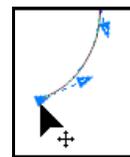
*Clicking and dragging a node will change the position of a node as well as the shape of the curve.*
*You can move nodes using the arrow keys as well.*
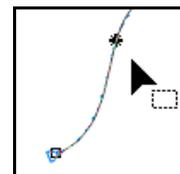
*Adding nodes increases the amount of control you have on the object's shape.*

*Deleting nodes creates a smoother shape.*

## Aligning Nodes
- Select two nodes by clicking and dragging a bounding box around the nodes.
- Click on *Align Nodes.*
- A dialog box appears so that you can select the type of alignment you need. Select the type of alignment and click *OK*.

## Reverse Direction
- *Reverse Direction* will change the beginning and ending of the line segment.
- It does not influence the shape of the line.

## Converting Lines
- While still in reshape mode, you can also change the line segments.
- Select a node in the drawn line.
- Click on *Convert to Line*.
- This converts the line segment in front of the selected node to a straight line.
- Convert to Curves icon will convert the line segment to a curve, which can then be reshaped by using the control handles.

## Reshaping the Line
- To reshape the line, select a control handle of a node and move it.
- Experiment by shortening the length of the control handle, moving the control handle, as well as moving the control handle of the adjacent node.
- Clicking and dragging a control handle will change the shape of the curve without moving the node.

## Connecting & Disconnecting Nodes
- Select the *Pen* tool. Draw another line similar to the shape shown.
- Press the space bar to select the line.
- Select *Reshape Vector Object.*
- Draw a bounding box around the beginning and ending nodes to select them.
- Click on *Extend Curve to Close.* This will join the beginning and ending nodes with a straight line.
- Select *Undo.*
- Reselect *Reshape Vector Object.*
- Select a node in the middle of the line.
- Select *Break Curve.*
- The line is now two separate lines that can be edited and moved independently of one another.
- Draw a bounding box around the two nodes that were previously one.
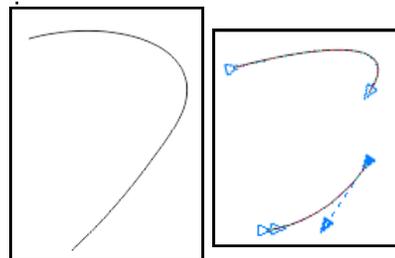- Select *Join Nodes* to make the nodes reconnect.

### Notes:

*Aligning Control Points aligns the control handles of the nodes.*
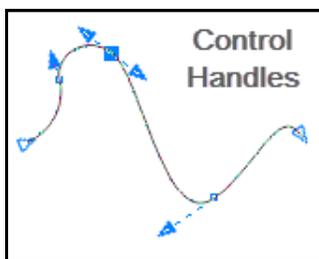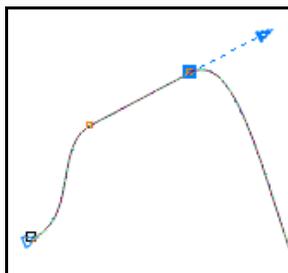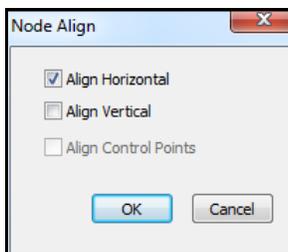


*Control handles affect the arc of the curve and changing them will affect the line segment on either side of the control handle. At the beginning of a line, there is only one control handle.*

*To rejoin nodes, you can also move one end and place it on top of the other node. They are automatically reconnected.*