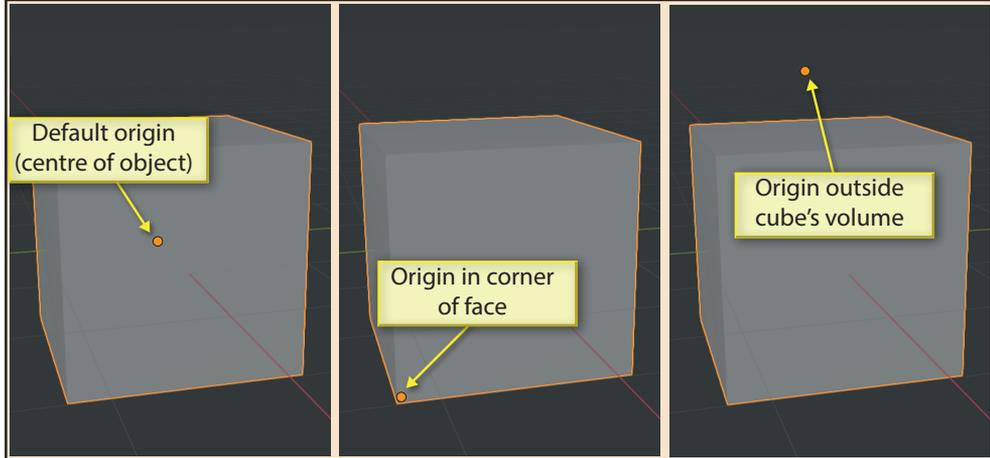**Object Origin**

An object's origin is used when positioning, rotating and scaling that object.
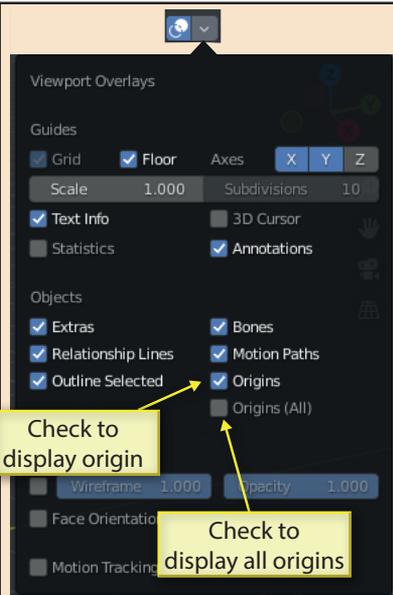
By default, an object's origin is at the object's centre but we can adjust its position in various way and this, in turn has an affect on all three transform operations.

We can move an object's origin to any position we require. That position need not be within the volume of the object itself.


Default origin (centre of object)

Origin in corner of face

Origin outside cube's volume

If no origin is visible in the selected object, then the **Viewport Overlays** *Origins* checkbox will need to be selected.

The origins of unselected objects can also be shown (in white) by selecting the *Origins(All)* option.

Viewport Overlays

Guides

Grid | Floor | Axes | X Y Z
Scale 1.000 | Subdivisions 10
Text Info | 3D Cursor
Statistics | Annotations

Objects

Extras | Bones
Relationship Lines | Motion Paths
Outline Selected | Origins
| Origins (All)

Check to display origin

Check to display all origins

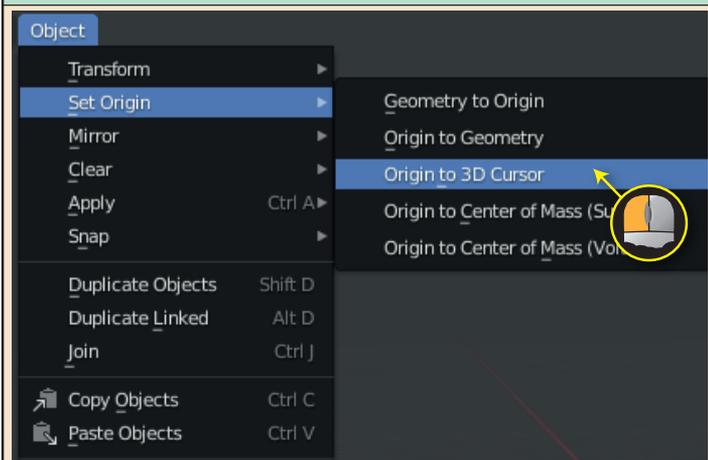Wireframe 1.000 | Opacity 1.000
Face Orientation
Motion Tracking

When an object is first created, its origin's position is determined by diagonals of an imaginary box (known as a **bounding box**) matching the dimensions of the object.
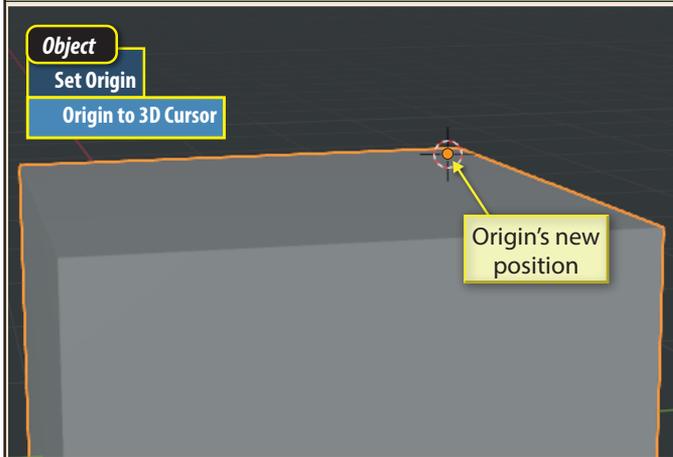

Imaginary box

Cone's origin

where box's diagonal's meet
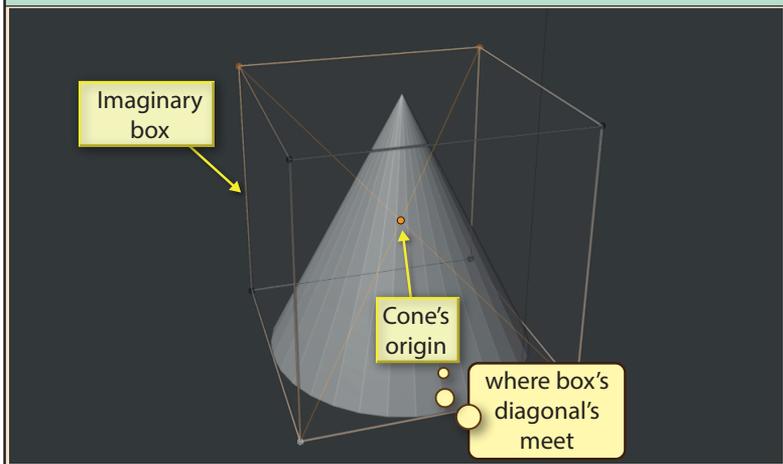
The simplest way to move an object's origin is to position it on the *3D cursor*. The *3D cursor* can be moved by pressing **Shift and right-clicking** at the required position (see the previous **3D Cursor** section for other move options).
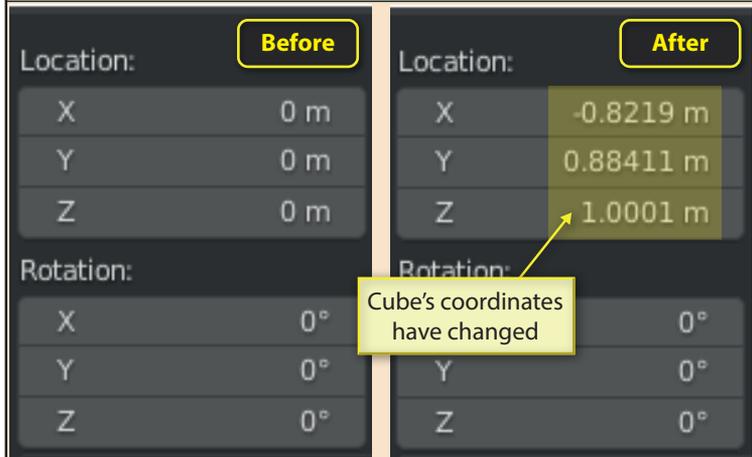

Shift + Move 3D cursor
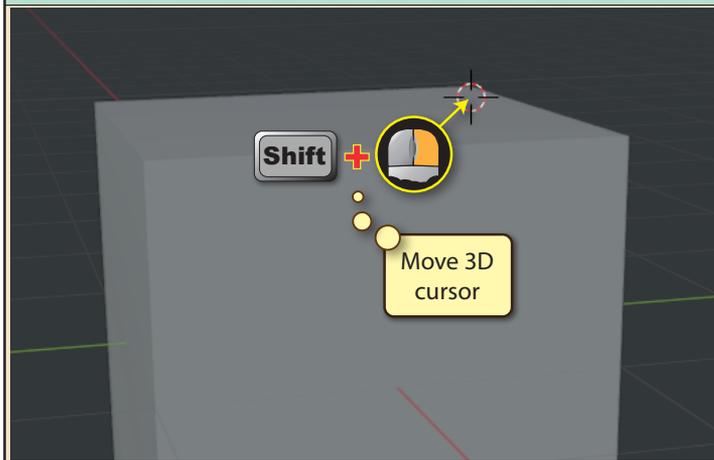
To move an object's origin onto the *3D cursor*, we need to select *Object* from the *3D Viewport*'s menu bar followed by *Set Origin* and then *Origin to 3D Cursor*.

Object

Transform
Set Origin ▶ Geometry to Origin
Mirror | Origin to Geometry
Clear | Origin to 3D Cursor
Apply Ctrl A ▶ Origin to Center of Mass (Su
Snap ▶ Origin to Center of Mass (Vo

Duplicate Objects Shift D
Duplicate Linked Alt D
Join Ctrl J

Copy Objects Ctrl C
Paste Objects Ctrl V

Blender Basics: Meshes in Object Mode 87

The cube's origin is now at the centre of the **3D cursor**.

Object
Set Origin
Origin to 3D Cursor
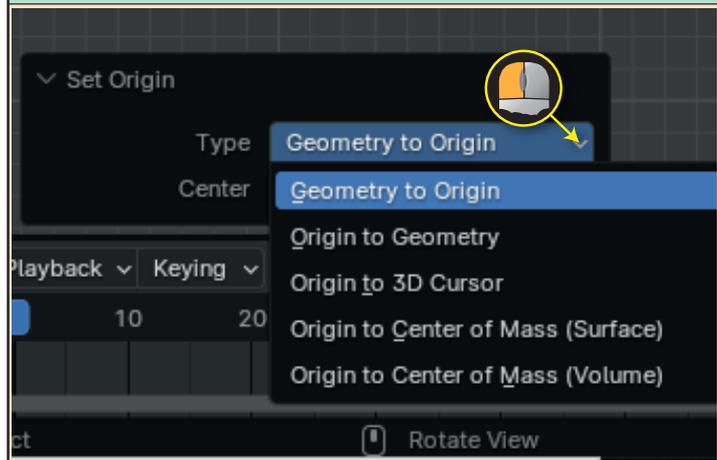
Origin's new position

Since an object's coordinates are determined by the position of its origin, we can see by examining the **Sidebar**, that by moving the origin, the default Cube's coordinates have changed even though the Cube itself has not moved.

|	Before		After
Location:		Location:	
X	0 m	X	-0.8219 m
Y	0 m	Y	0.88411 m
Z	0 m	Z	1.0001 m
Rotation:		Rotation:	
X	0°	X	0°
Y	0°	Y	0°
Z	0°	Z	0°

Cube's coordinates have changed

The first option in **Object>Set Origin** is, **Geometry to Origin**. This moves the selected object's mesh rather than its origin. The mesh is moved so that it encloses the origin.
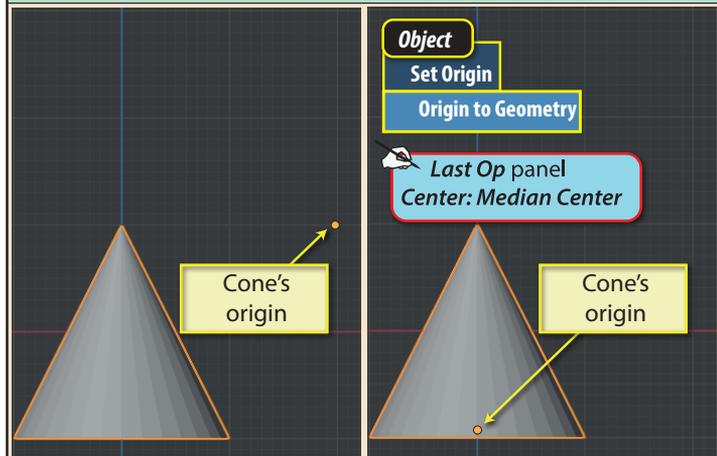

Before

Geometry to Origin

After

Origin

Cone moves to origin
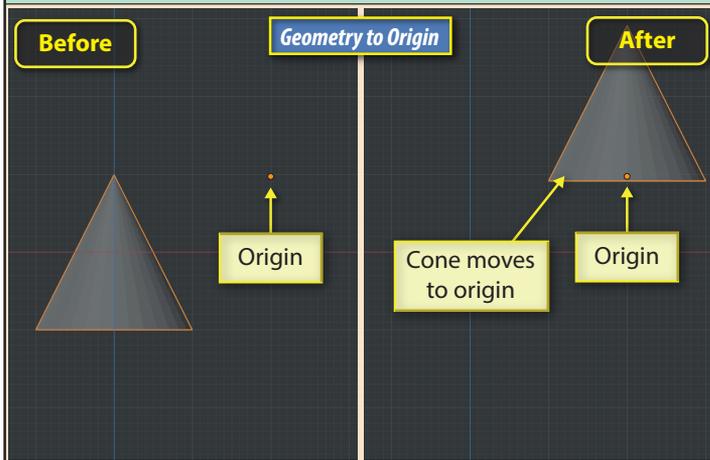
Origin

Now, in the **Last Op** panel, we see two parameters. **Type** shows the **Set Origin** option we have just choosen : **Geometry to Origin**. We could choose a different option if we've changed our minds.

∨ Set Origin

Type   Geometry to Origin
Center

Geometry to Origin
Origin to Geometry
Origin to 3D Cursor
Origin to Center of Mass (Surface)
Origin to Center of Mass (Volume)

Playback ∨   Keying ∨

10   20

ct   Rotate View

Center is the second field in the **Last Op** panel, and offers two options on how the origins exact position within the mesh is calculated: **Median Center** (average coordinates of all vertices) and **Bounds Center** (bounding box centre).

∨ **Set Origin**
Center   Median Center ∨

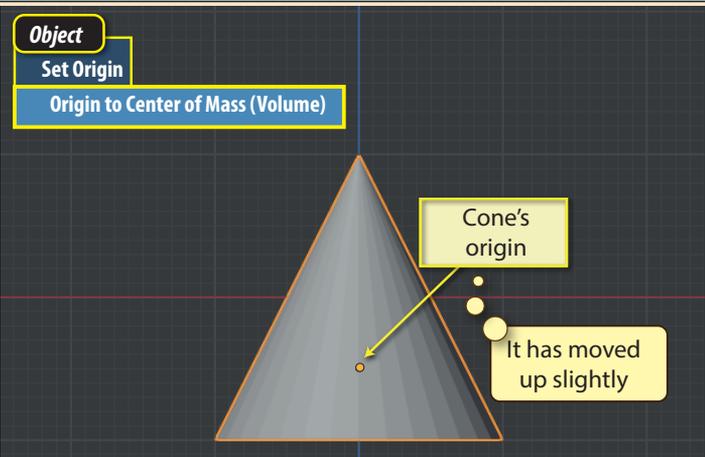∨ **Set Origin**
Center   Bounds Center ∨
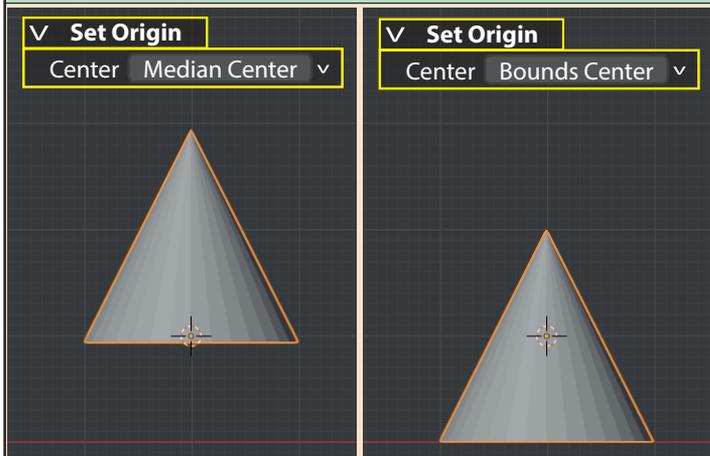
Object>Set Origin>Origin to Geometry moves the origin rather than the mesh. Again, in the **Last Op** panel, we can choose between **Median Center** and **Bounds Center**.
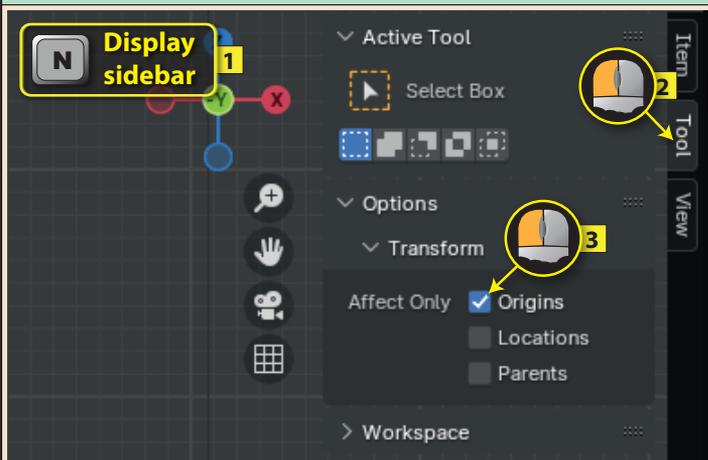

Object
Set Origin
Origin to Geometry

Last Op panel
Center: Median Center

Cone's origin

Cone's origin

Blender Basics: Meshes in Object Mode

Object>Set Origin>Origin to Center of Mass (Surface) positions the origin at the average of the surface coordinates of the selected mesh. Entries in the *Last Op* panel have no effect.

Object
Set Origin
Origin to Center of Mass (Surface)

Cone's origin
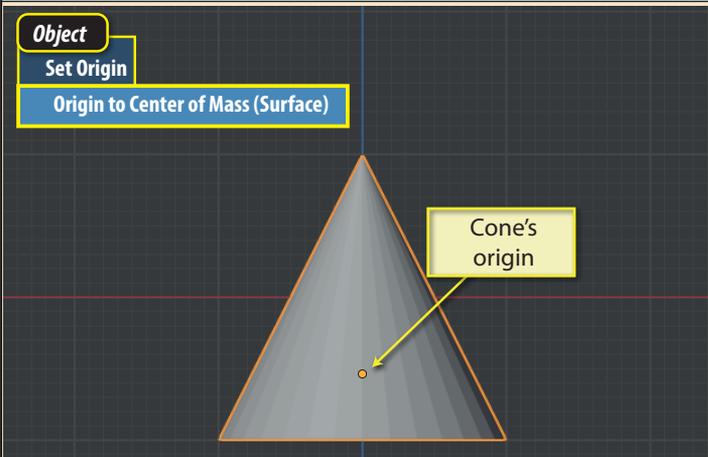
Object>Set Origin>Origin to Center of Mass (Volume) positions the origin at the centre of mass of the mesh's volume. This assumes that all parts of the volume are of equal mass. Entries in the *Last Op* panel have no effect.

Object
Set Origin
Origin to Center of Mass (Volume)

Cone's origin

It has moved up slightly

A more direct way to move the selected object's origin is to press **N** to display the *Sidebar* and then select the *Tool* tab. On this page we need to select the *Affect Only Origins* option.
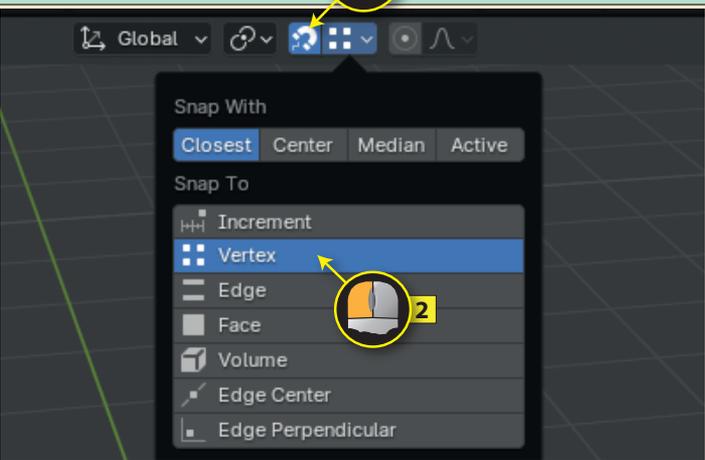
N Display sidebar 1

∨ Active Tool
▸ Select Box 2
∨ Options
  ∨ Transform 3
  Affect Only ☑ Origins
           ☐ Locations
           ☐ Parents
▸ Workspace

This displays a set of axes over the object's origin. These are **Local axes** of the object.

Set of axes displayed
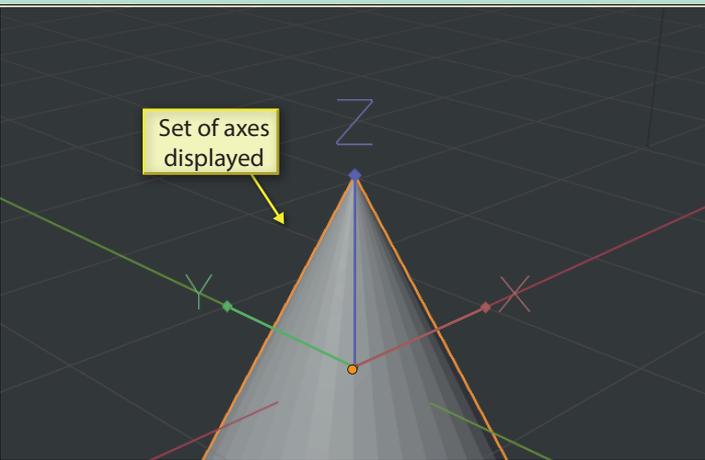
By pressing the **G** key, we grab the origin (and its *Local axes*); it will then move along with the mouse pointer. Pressing the left mouse button completes the move while pressing the right mouse button undoes the move.

G Move (grab) 1
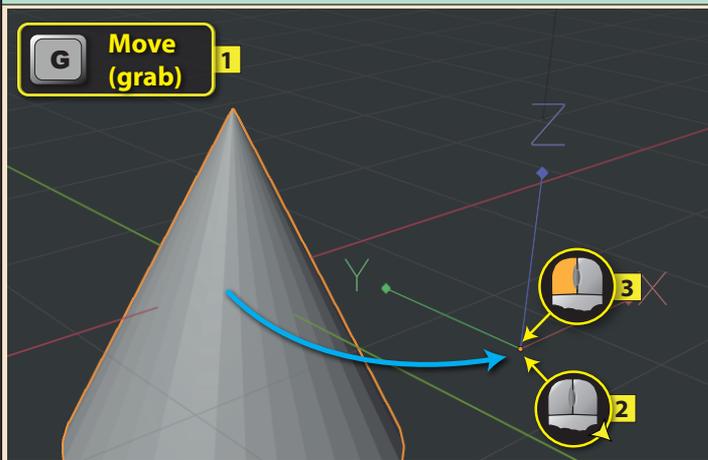
Moving the origin in this way can be combined with snapping. If we switch on snapping, and select the *Snap To* option we require...

1

⇱ Global ∨ ⌀∨ 🧲 ▦∨ ⊙ ∧∨

Snap With
Closest | Center | Median | Active

Snap To
⊬ Increment
▦ Vertex
≡ Edge 2
▪ Face
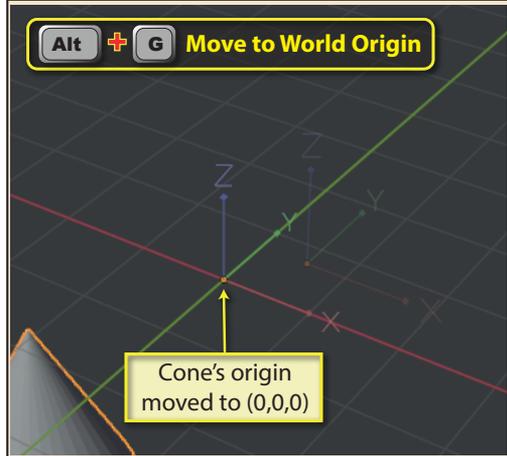◩ Volume
⌁ Edge Center
▫ Edge Perpendicular

...then we can snap the origin to any required position. Movement is achieved in the usual way by pressing **G** and moving the mouse to near the required position and then pressing the left mouse button.
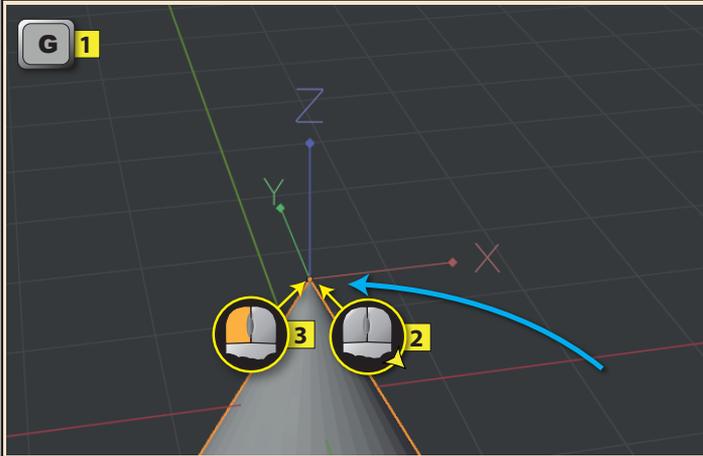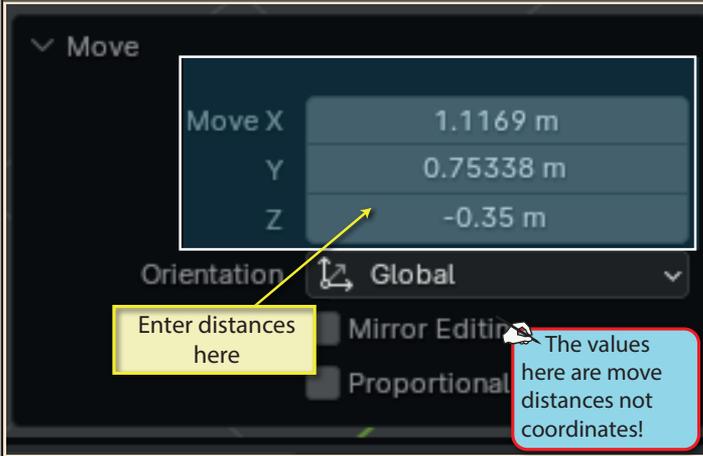
If we want to return the mesh's origin to the *World Origin* we can press **Alt G**.

Alt + **G** **Move to World Origin**

Cone's origin moved to (0,0,0)

When we are moving the origin, the *Last Op* panel offers a few parameters. Only the **Move** fields are relevant, allowing us to specify the actual distances to be moved from its current position.

∨ Move

Move X	1.1169 m
Y	0.75338 m
Z	-0.35 m

Orientation ↳ Global

Enter distances here

The values here are move distances not coordinates!

However, be aware that the *Location* fields on the Item page of the *Sidebar* allow us to enter exact coordinates for the origin but the mesh itself will also move.

∨ Transform

Location:
X	1 m
Y	2 m
Z	-2 m

Origin now at (1,2,-2)

Cone has also moved
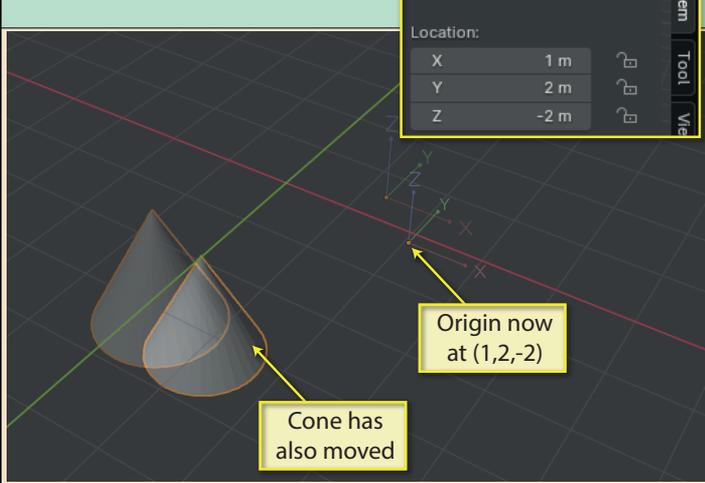
Finally, we must remember to uncheck the **Affect Only Origins** box before continuing with our project

∨ Active Tool
▸ Select Box

∨ Options
∨ Transform
Affect Only ☐ Origins
☐ Locations
☐ Parents
> Workspace

Options ∨