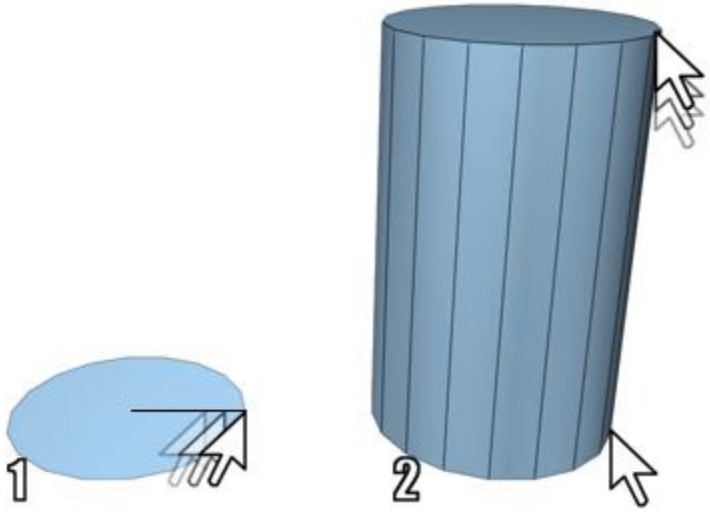
# Computer Aided Design

**3Ds Max Lecture Notes**

**Note: Detailed explanations should be taken from the notes that were given in the lectures.**

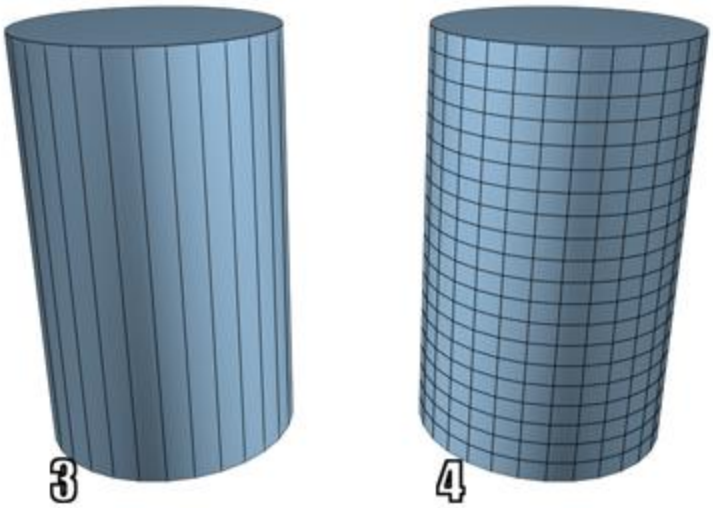
## Creating Basic Objects

With some variations, the steps shown in the following images apply to creating any type of object on the Create panel. For specific examples, see the Procedures section in any object's topic.




**1. Radius defined**

**2. Height defined**




**3. Sides increased**

**4. Height Segments increased**

To choose an object category:

1. Click (Create tab) to view the Create panel.
2. Click one of the buttons at the top of the Create panel. For example, (Geometry).
3. Choose the subcategory Standard Primitives from the list.

   A number of buttons appear on the Object Type rollout.

To choose an object type:

- Click the button for the type of object you want to create.

  The button highlights, showing that it is active. Four rollouts appear: Name and Color, Creation Method, Keyboard Entry, and Parameters.

To choose a creation method (optional):

You can accept the default method and skip this step.

- Choose a method in the Creation Method rollout.

To preset the creation parameters (optional):

You can adjust *all* creation parameters after you create an object. Skip this step if you prefer.

- In the Parameters rollout, you can set parameters before you create an object. However, the values of parameters you set by dragging the mouse (for example, the Radius and Height of a cylinder) have no effect until after you create the object.

To create the object:

1. Put the cursor at a point in any viewport where you want to place the object, and hold the mouse button down (do not release the button).
2. Drag the mouse to define the first parameter of the object; for example, the circular base of a cylinder.
3. Release the mouse button. The first parameter is set with this release.

   In some cases, such as Sphere, Teapot, and Plane, this completes the object. You can skip the remaining steps.

4. Move up or down without touching the mouse button. This sets the next parameter; for example, the height of a cylinder.

   *If you want to cancel:* Until you complete the next step, you can cancel the creation process with a right-click.

5. Click when the second parameter has the value you want, and so on.

   The number of times you press or release the mouse button depends on how many spatial dimensions are required to define the object. (For some kinds of objects, such as Line and Bones, the number is open-ended.)

Tip: While creating a multi-step object (between clicks), you can navigate the viewport interactively as follows:

- To pan the viewport, scroll the mouse wheel or drag while holding down (the middle mouse button).
- To orbit the viewport, press and hold while scrolling the mouse wheel or holding down .
- To zoom the viewport, scroll the mouse wheel or hold down and and drag forward and back with .

When the object is complete, it is in a selected state and ready for adjustments.

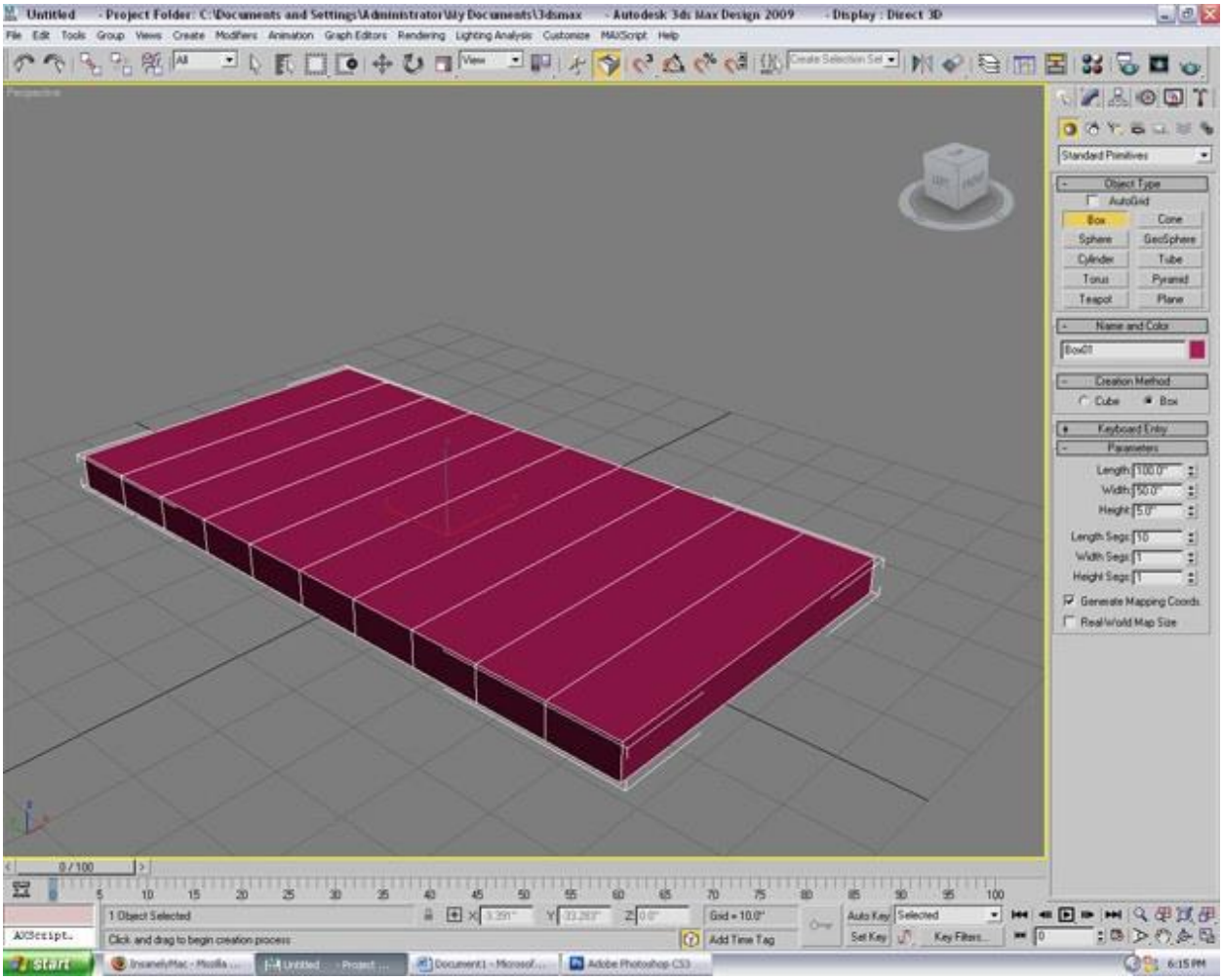
To name the object (optional):

3ds Max gives each new object a default name based on the primitive type and the order of creation. For example: *Box001, Sphere030.* You can change the name to anything you like using the method described following.

**Ref [https://knowledge.autodesk.com/support/3ds-max/learn-explore/caas/CloudHelp/cloudhelp/2015/ENU/3DSMax/files/GUID-46FD7C8B-7710-4B61-9A14-C8F385D255B0-htm.html]**

## Editable poly

Start with a box. The length, width, and height parameters are up to you depending on how long, wide, and tall you want your stairs to be. This part does not matter much because editable poly will distort these parameters (Fig.01).

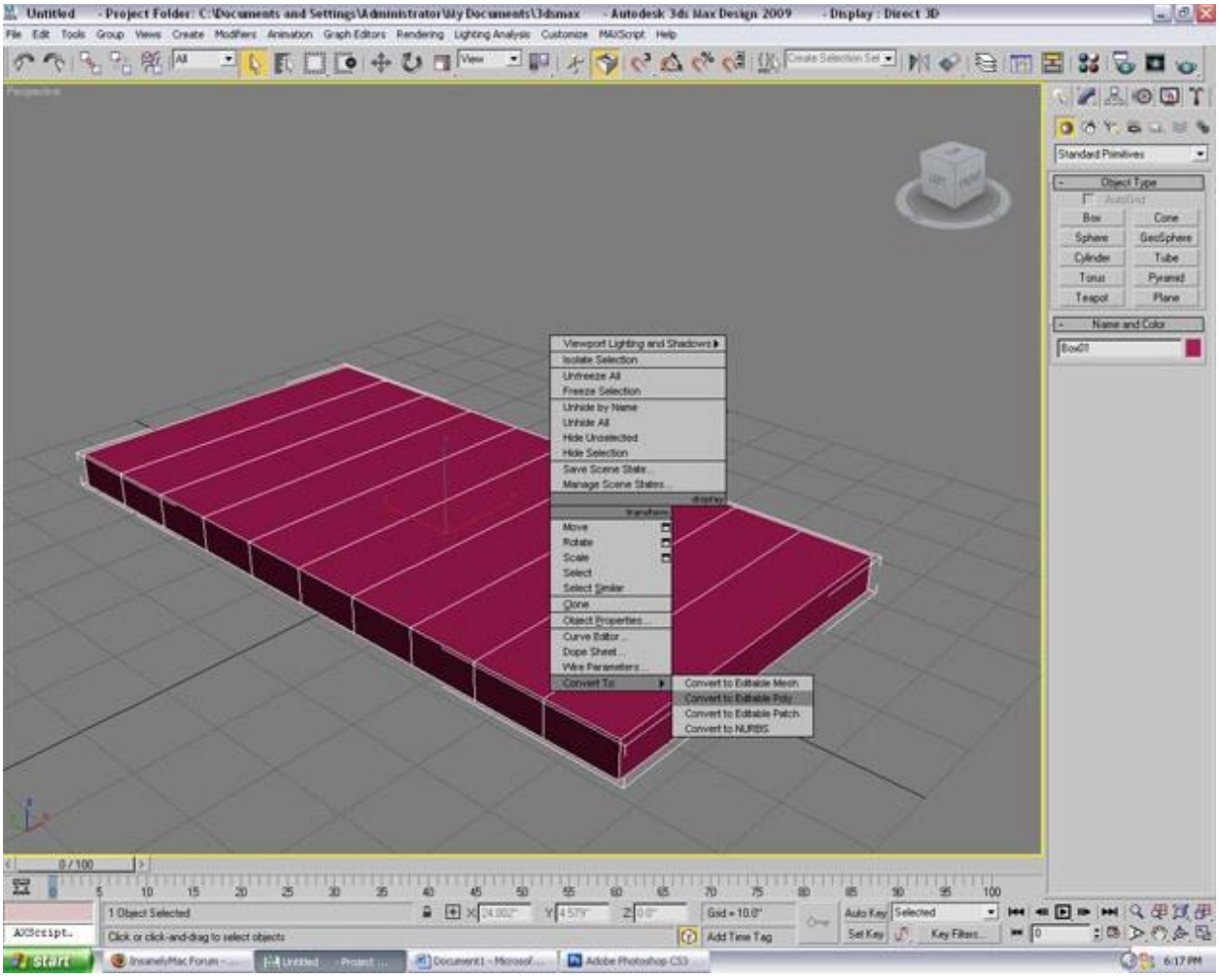


The used parameters are:
Length: 100.0"
Width: 50.0"
Height: 5.0"

Length Segments: 10
Width Segments: 0
Height Segments: 0

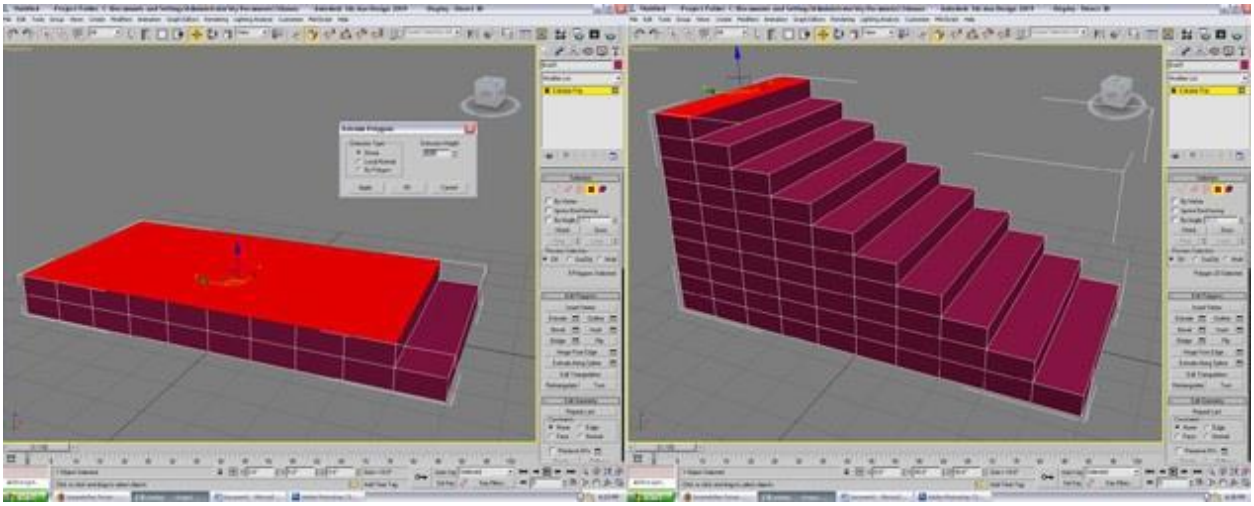
The amount of length segments will later be the amount of stairs.

Right click on your object > Convert to > Convert to Editable Poly




.

Click "Polygon" under the "Selection" Rollout. Select all but one polygon and then hit the box next to "Extrude" under the Edit Polygons rollout. When the Extrude Polygons box appears, click "Group" under "Extrusion Type" and type 5.0" under "Extrusion Height". Continue this until you get something that looks like stairs.



Select each step and hit "Extrude". Type 1.25".

Select the polygons as seen in Fig.04 and extrude those 1.25".

**Ref: https://3dtotal.com/tutorials/t/editable-poly-for-beginners-matt-danis-beginner-stairs-model**

**Material Editor**

Press M from keyboard to open the Material editor panel.

### *Sample Slot Border*

The border to each sample slot shows the status of the materials in the editor thus:

- White border means the sample slot is current ie the material can be edited
- White triangles not filled means the material exists in the scene (assigned to an object) but no objects with that material are selected
- White triangles filled means the material in the slot is assigned to a selected object

### Toolbar

- Press **Get Material**. This opens the Material/Map Browser. This is where you manage material and map resources in and out of the scene

- Select the Box and in the Material Editor select the Brick material sample slot. Press **Assign Material to Selection**. Notice in the viewport the box is assigned the brick material

- Press **Show Map in Viewport**. This shows the brick map which is part of the Brick material in the viewport or not. Toggle this on and off and notice the bricks on the box are shown or not shown

- Press **Put to Library**. This opens a dialog box for saving the current material to a material library. Close the box as this is explained later

- **Go to Parent** is used when you are at the 'Map' level (accessed through pressing one of the Map buttons - explained later) to return to the next level up in the material. This is greyed out if no Maps are used in the material

TIP: You can remove a materiall completely from an object in the scene by dragging the NONE item from the Material / Map Browser over to the object

- Select an empty sample slot and press **Pick Material from Object**. This is a quick way to select a material in the scene for editing purposes

## Material Name

Type the name of the current material in this text box

## Material Type

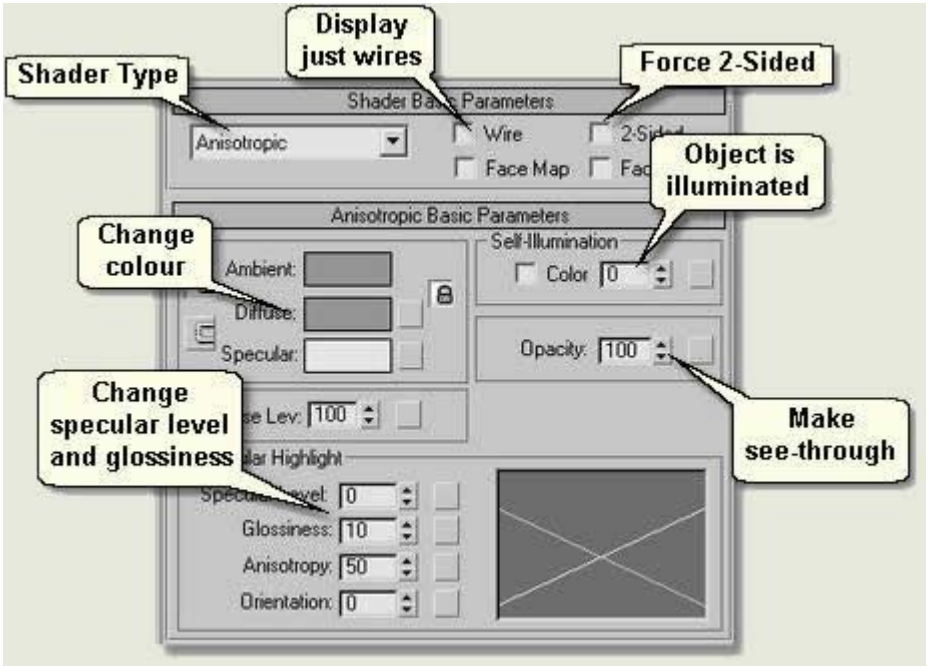
The Material Type is at the top of the hierarchy when you create or edit materials. **Standard** is the default material type in MAX and **Architectural** is the default material in Autodesk VIZ (this has been changed to Standard for this exercise)

-

Press this button (in MAX) or the button displaying 'Architectural' (in VIZ) to open the Material/Map Browser and to pick from a selection of Material Types. The most common for landscape use are Standard (most materials including none mapped and mapped materials - procedural maps and image maps), Double Sided (contains two standard materials for the front and back of a road sign for example) and Multi > Sub-Object (for use on any objects that contain a number of elements needing different materials assigned to each element - a seat with painted legs and wood slats for example)
- If you are using VIZ select **Standard** and press **Ok** as we are going to explore the use of Standard materials

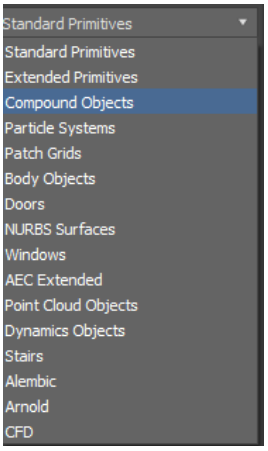
- The next step is to look at the shader type thus:

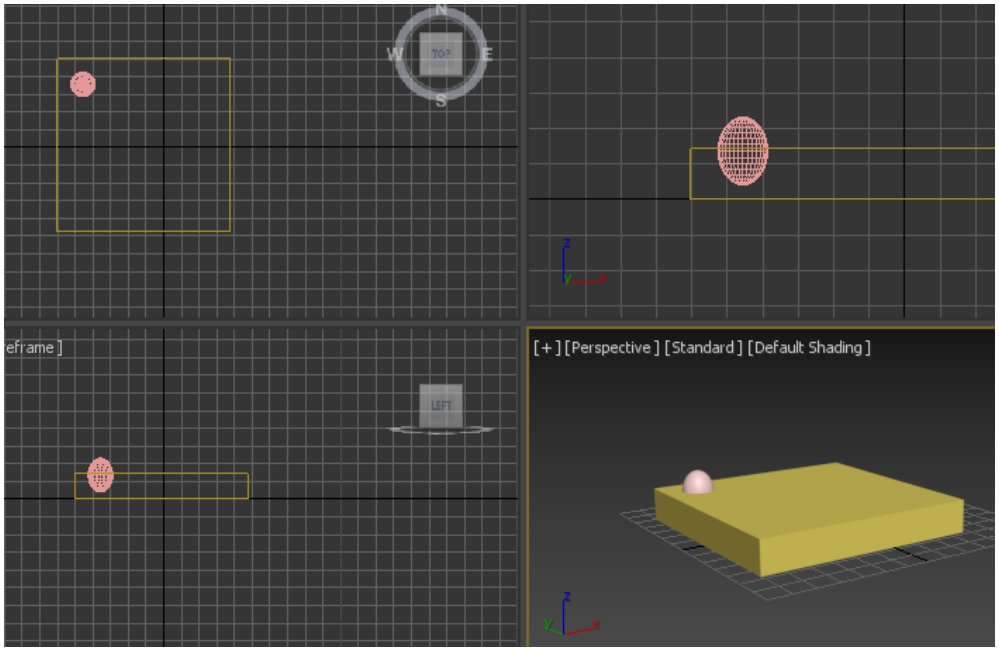
**Shader Parameters**

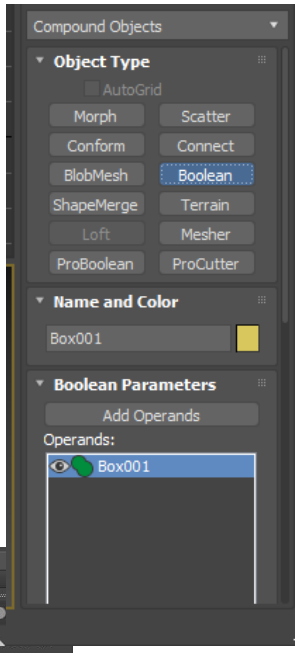


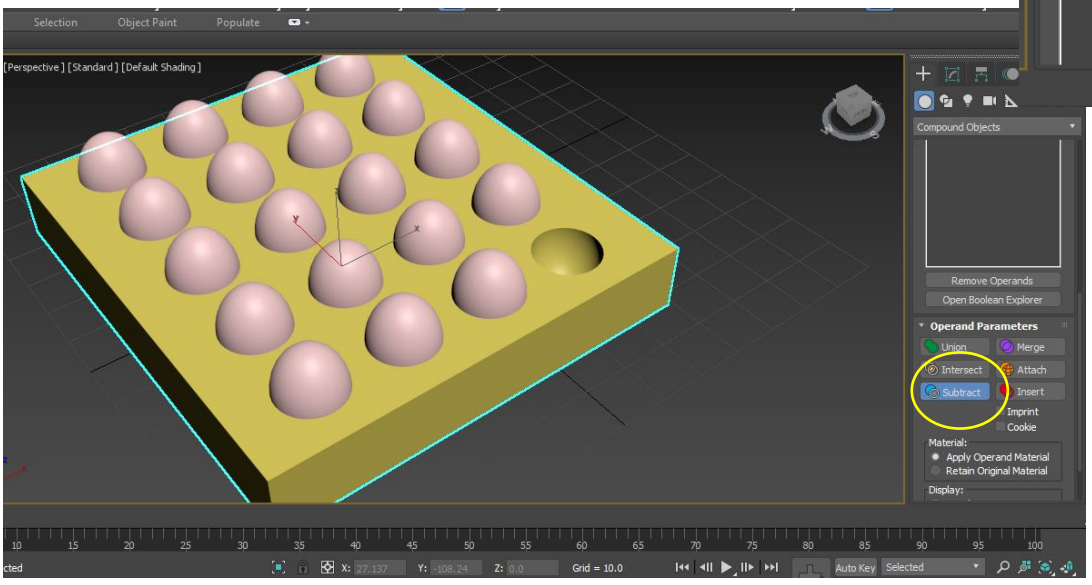
## Compound Objects (Boolean)

1. Create a box and an egg and locate them as shown in the figure below.
2. Copy the Egg ( Shift + Move) to fill the box
3. Choose the box and select “Compound Object from geometry
4. Choose Boolean and choose Add operands.
5. Select an egg and set the parameter to Subtract.



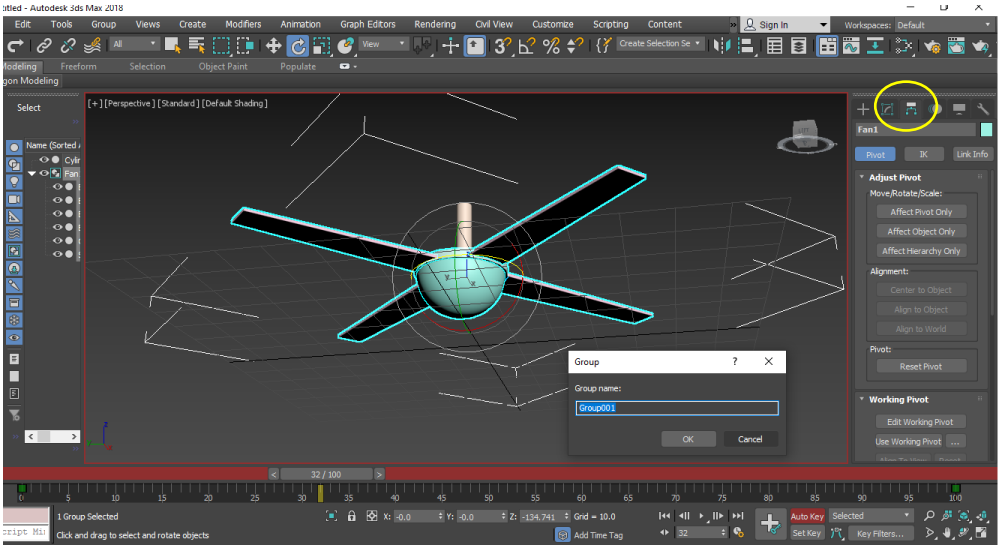
## Grouping Objects

To create a shape that consist of set of sub-objects, as a ceiling fan, follow the steps below:

1. Select the different parts using CTRL key.
2. Go to Group from menu bar and choose Group
3. Give a name for the grouped objects

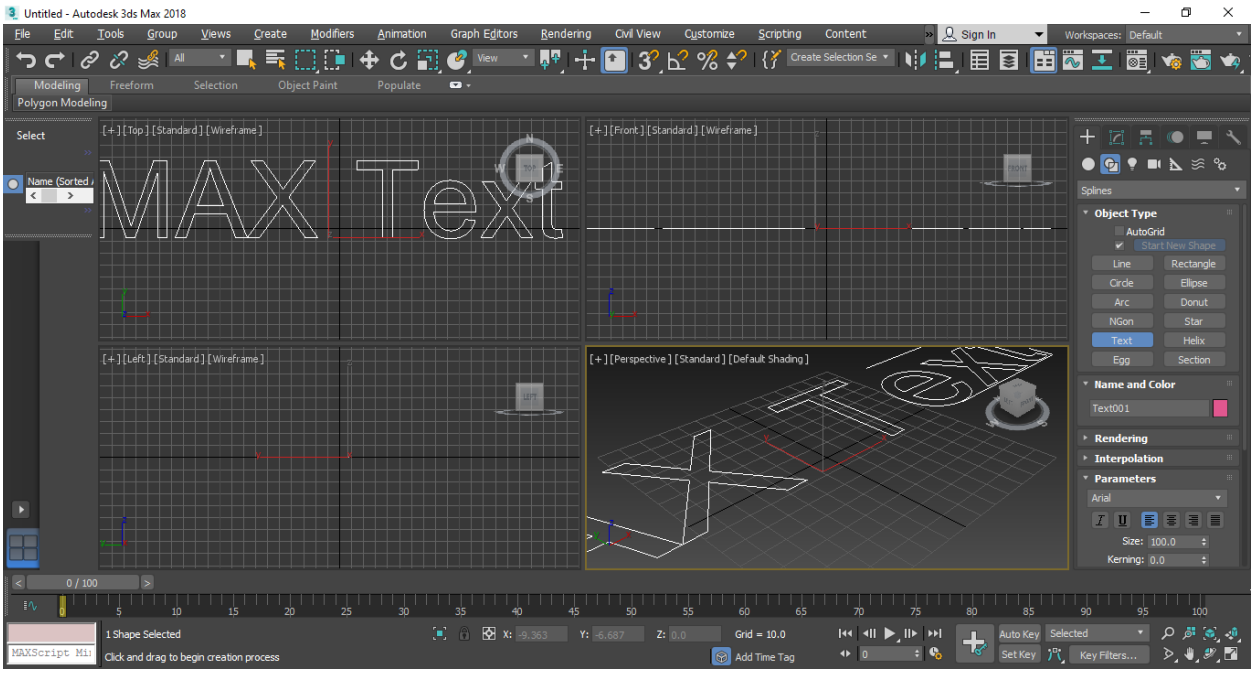
The rotation (For Example) can be done for all objects as a one object.

Note: To change the pivot point ( like the center of the object where it rotated) click on Hierarchy and click on Pivot and choose Affect Pivot only and move the center point

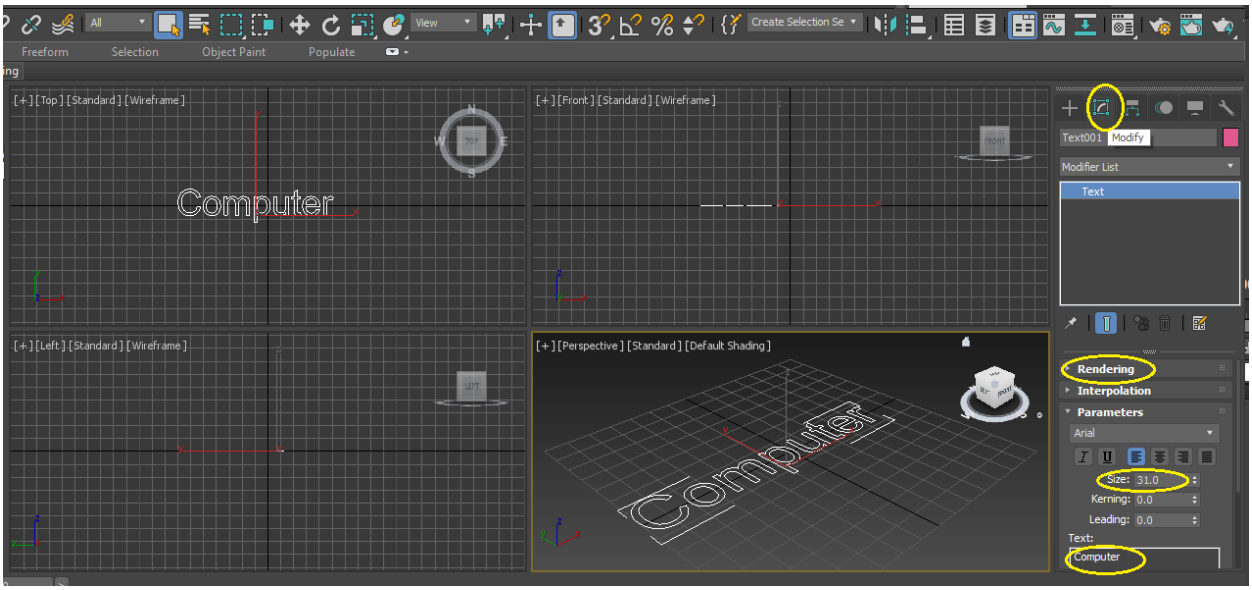


## Design Using 2D Shapes

To create a 2D object, click on shapes icon and from Splines choose the 2D shape to create, e.g. Text. Press on the perspective to create the text, the default text will be as MAX Text, as shown in the Figure below.




After Adding the text, select it and go to modify panel, and change the size and the text content as shown in the figure below:

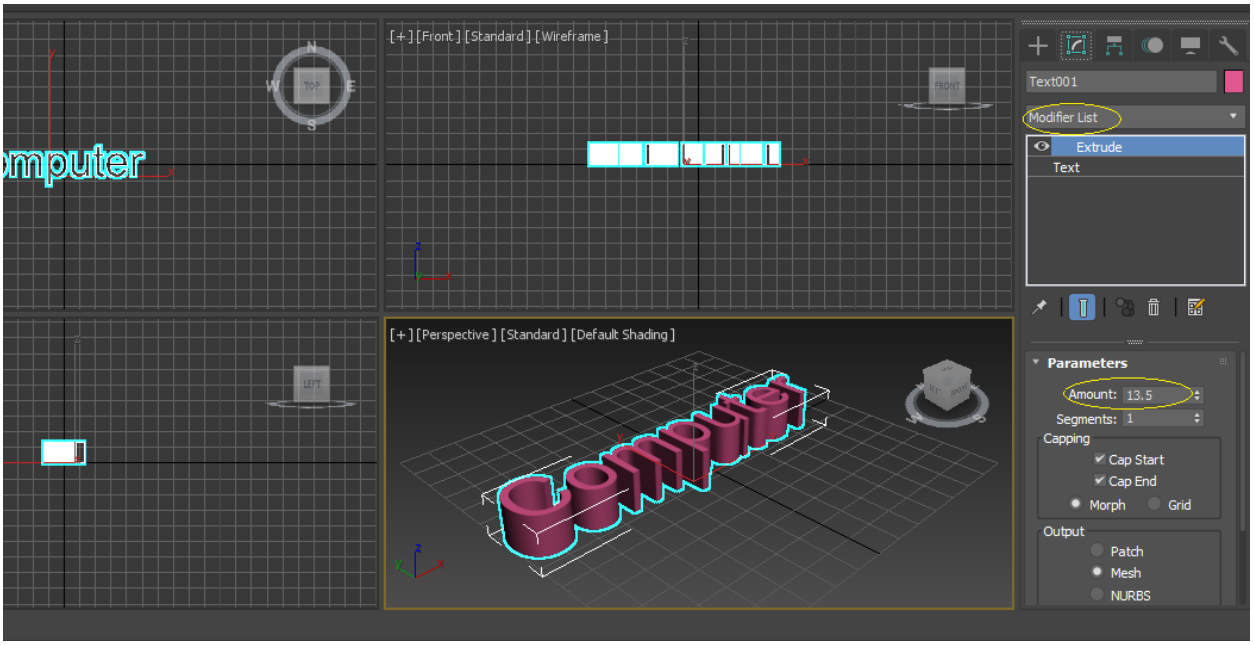


The modify panel can be used to modify any geometry or shape after creating it.

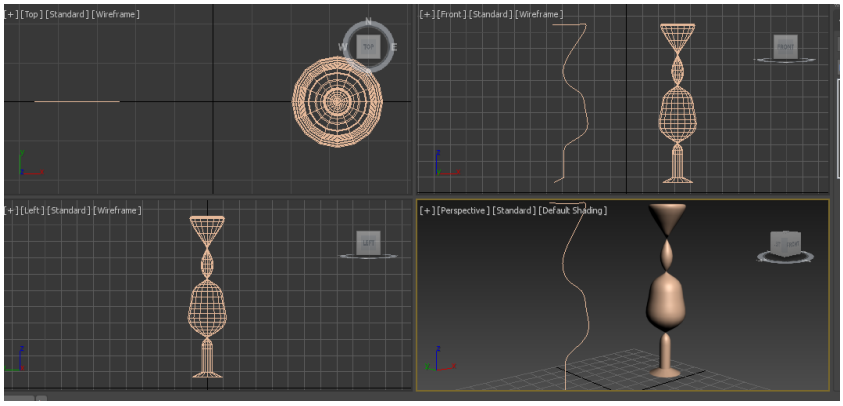
To show the shape in rendering and view ports, press on the triangle near Rendering and check the boxes Enable in Renderer and Enable in view port.

Extruding objects to be 3D geometrics.

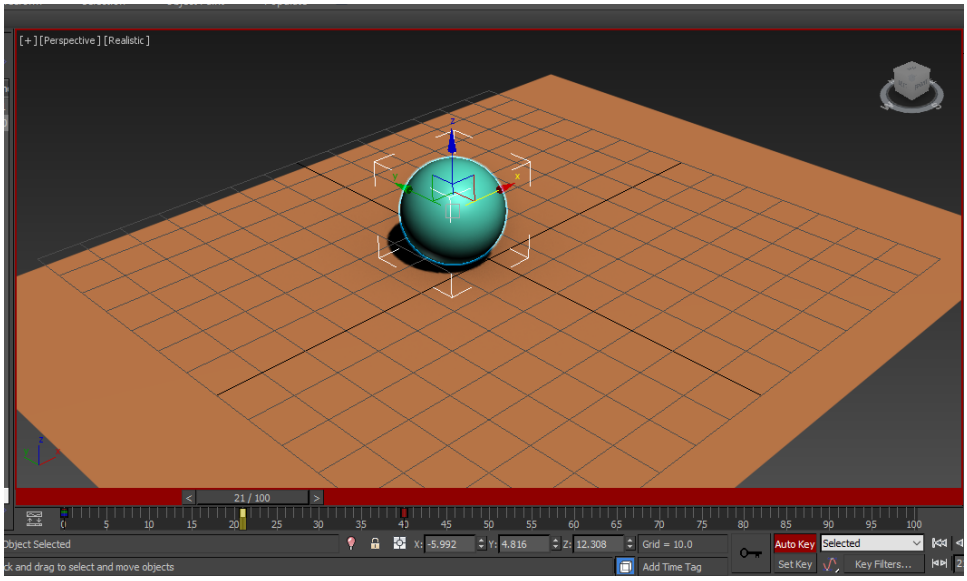
Choose the text and go to modify panel, and from modifiers' list select Extrude, and change the amount from 0 to another value to see the extrude effect.



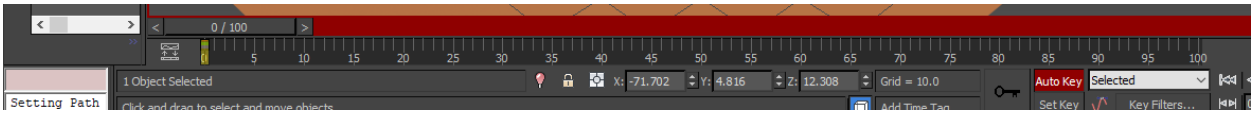

H.W : Apply the Lathe modifier from modifier List to convert a line to an object as shown in the figure.



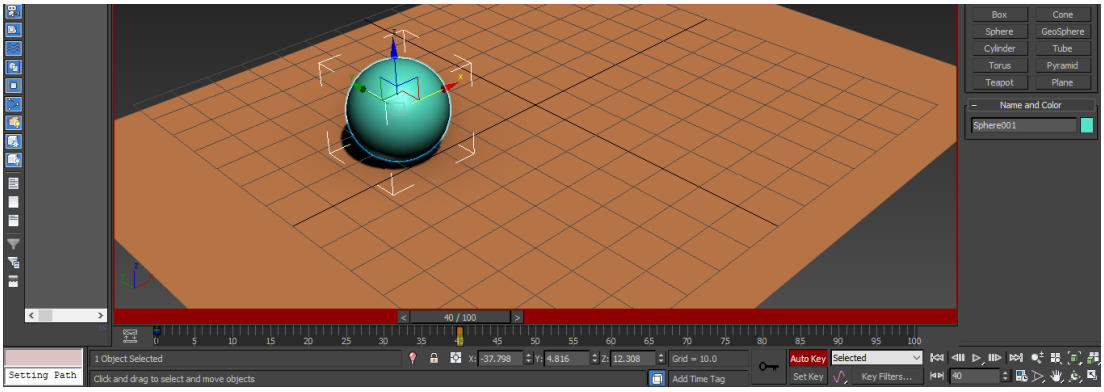
# Animation




1. Choose the object to be animated
2. Choose Auto key. The time slide will be in red color

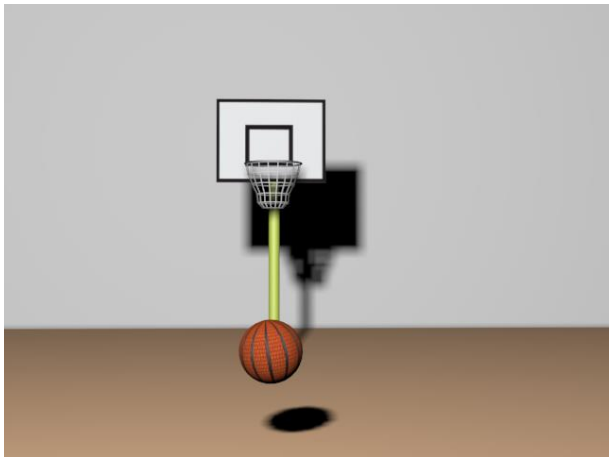


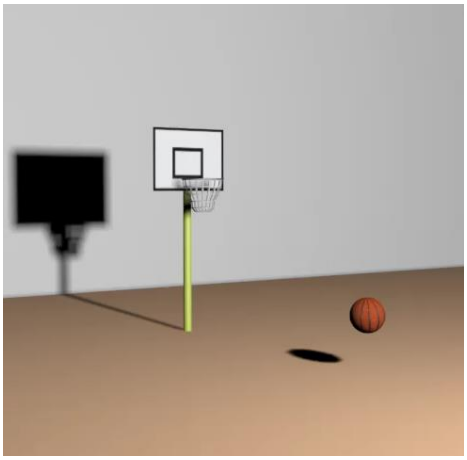

3. Press on the key icon to set an initial key manually, it will save the position, the rotation and the scale of the object at the first frame.
4. Move the slider to another frame (Ex:40)
5. Move the object to another position ( A new key frame will be set automatically.
6. Move the slider



Class Work: Create a ball and apply the material “checker”. Move it while rotating to four corners.

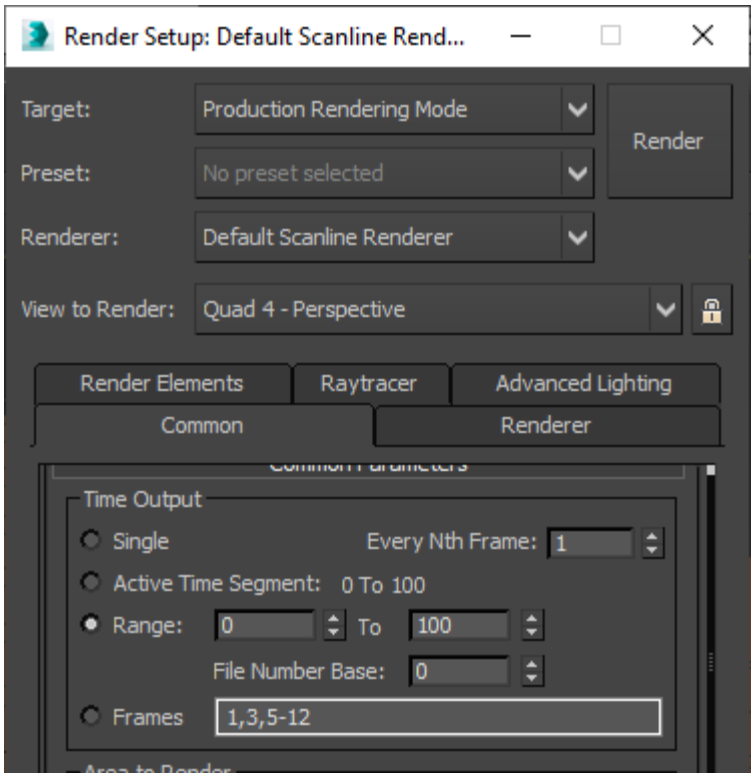
Classwork: Create the figure below and use the animation to score the ball. Materials are found on desktop.

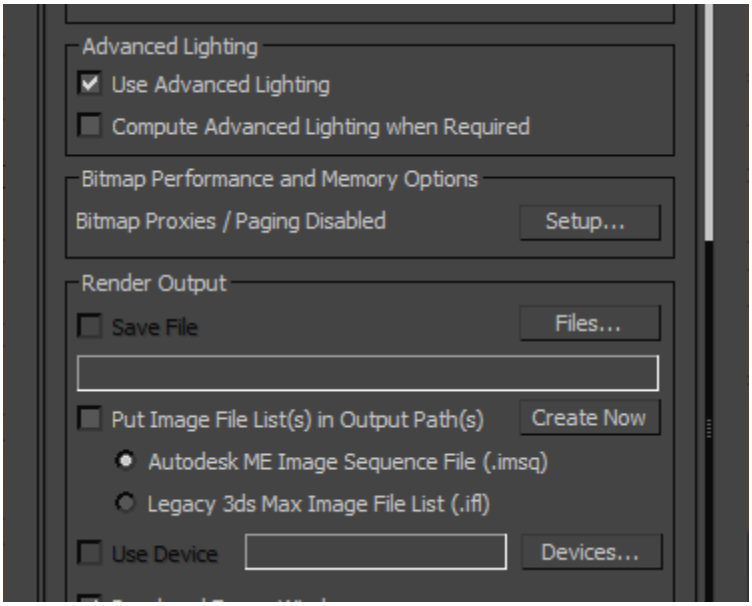




**Rendering**

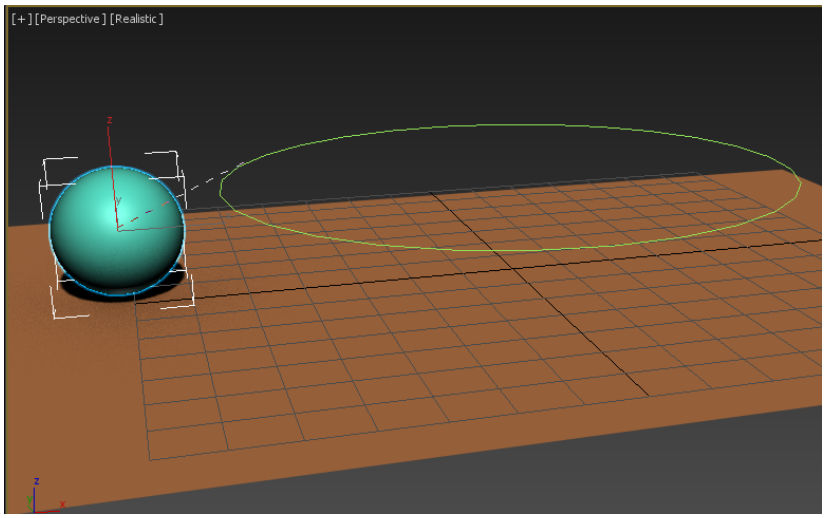
1. Press F10 to show the render setup panel.
2. The default rendering is a single frame. To render multiple frames, choose Range and select the range of frames to be saved as a video file or set of frames.
3. From Render output, choose files to select the location, name and format of the output to be saved.
4. Press Render button.


Render Setup: Default Scanline Rend...
Target:
Production Rendering Mode
Render
Preset:
No preset selected
Renderer:
Default Scanline Renderer
View to Render:
Quad 4 - Perspective
Render Elements
Raytracer
Advanced Lighting
Common
Renderer
Time Output
Single
Every Nth Frame: 1
Active Time Segment: 0 To 100
Range: 0 To 100
File Number Base: 0
Frames
1,3,5-12


Advanced Lighting
Use Advanced Lighting
Compute Advanced Lighting when Required
Bitmap Performance and Memory Options
Bitmap Proxies / Paging Disabled
Setup...
Render Output
Save File
Files...
Put Image File List(s) in Output Path(s)
Create Now
Autodesk ME Image Sequence File (.imsq)
Legacy 3ds Max Image File List (.ifl)
Use Device
Devices...

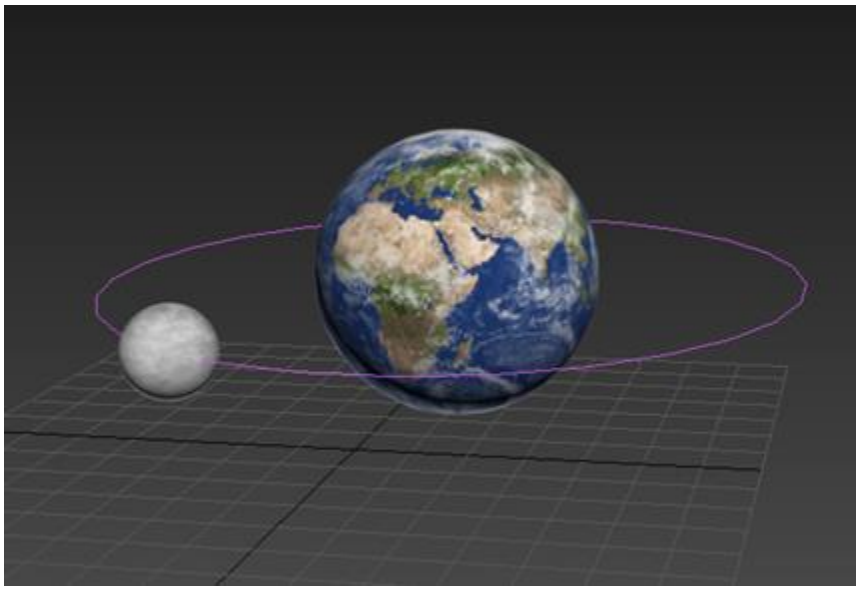
## Animation Using a Path

1. Create a Two-dimensional shape (Ex: A circle)
2. Choose the object that will follow the path (Ex: A ball).
3. Go to Animation from menu bar → constraints→ path constraint.
4. A dotted line will be shown, drag it to the 2d shape.
5. The geometric object will follow the path.




**Homework**

Create a solar system of Earth and Moon using path animation.

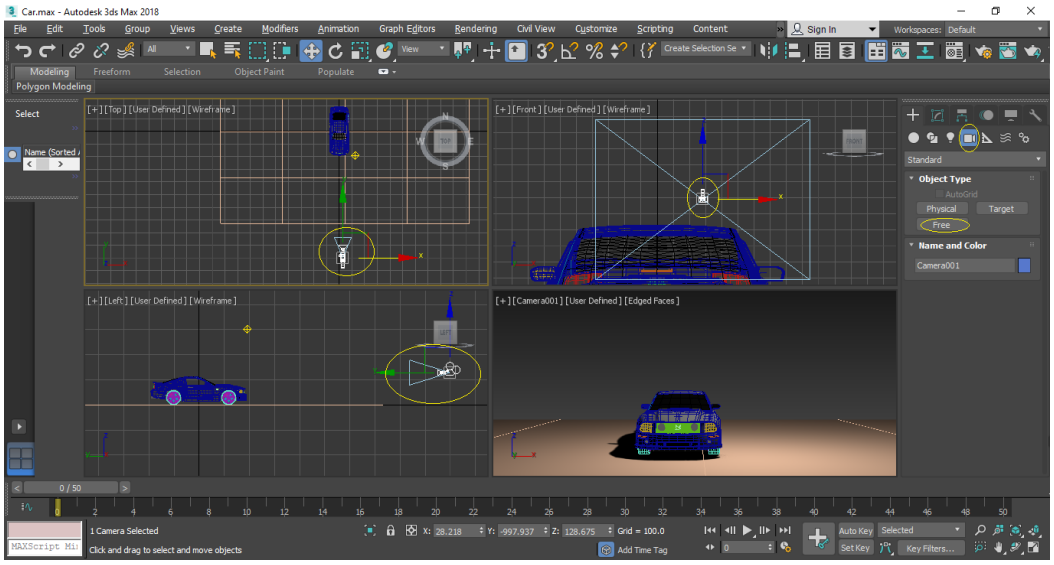


**Homework.:**

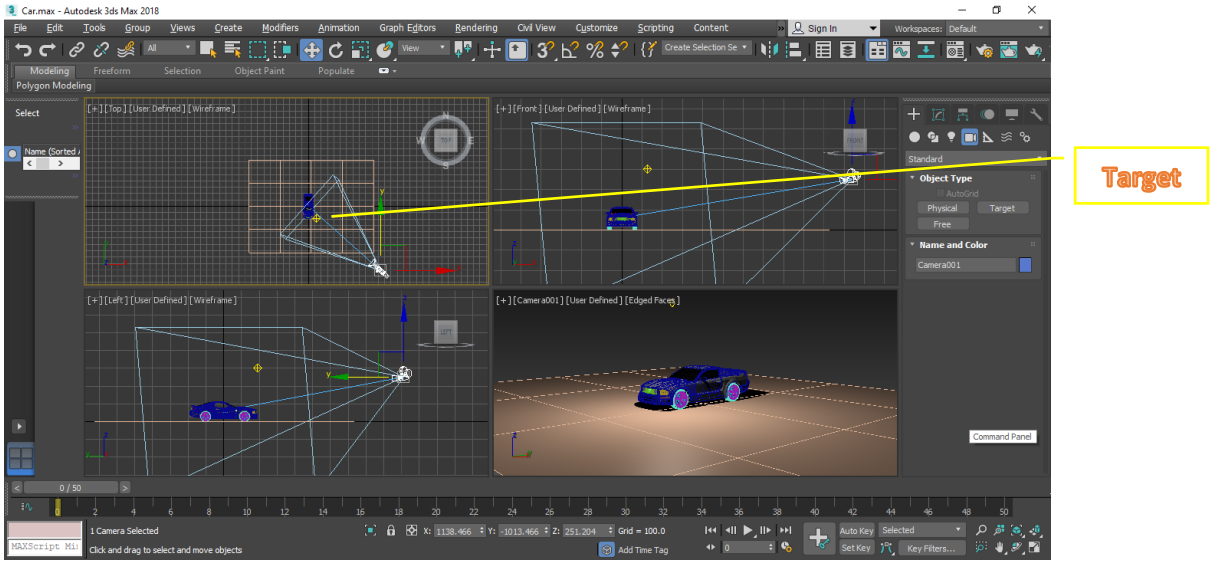
Create the following scene and rotate the fan using animation

## Cameras

To capture the scene using Cameras go to Cameras and choose Free camera, Add the camera in the front view (For Example) and go to other view as perspective and press on C from keyboard to show the camera captured scene. Move / Rotate the camera for better view. The camera can be animated using keyframes as any objects.




Using the Target camera, the camera can be moved while keeping the target fixed, it is used to show a specific object from different perspectives.

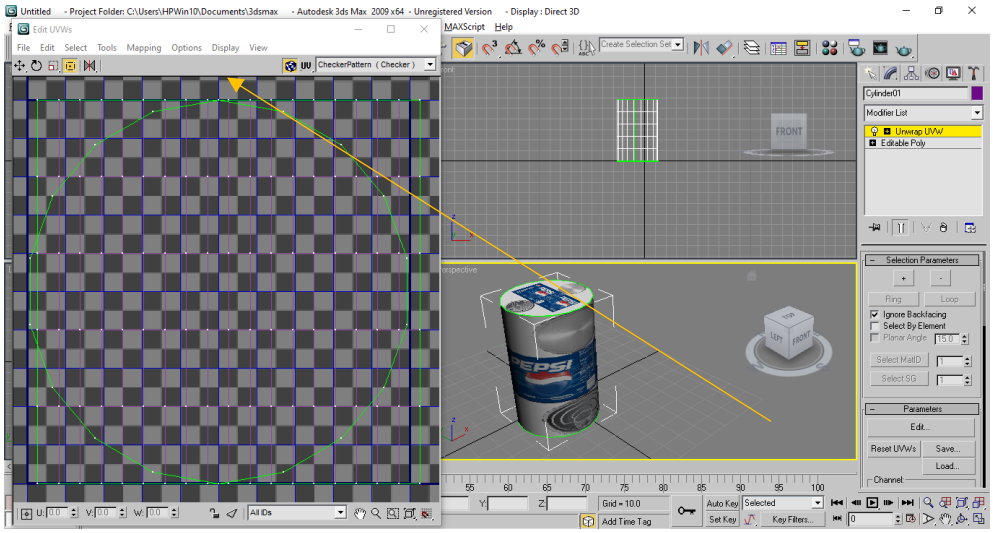


# UNWRAP UVW

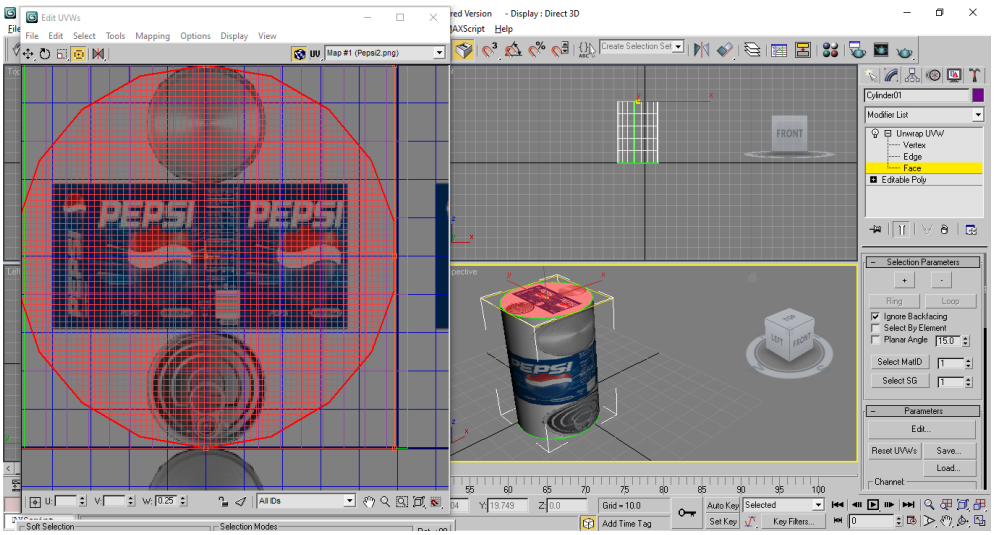
Unwrap UVW is used for adding materials to objects with several faces or non-geometrical objects. For example, covering a cylinder body with a material can be done instantly, but adding the materials to the top cap and bottom needs Unwrap UVW.

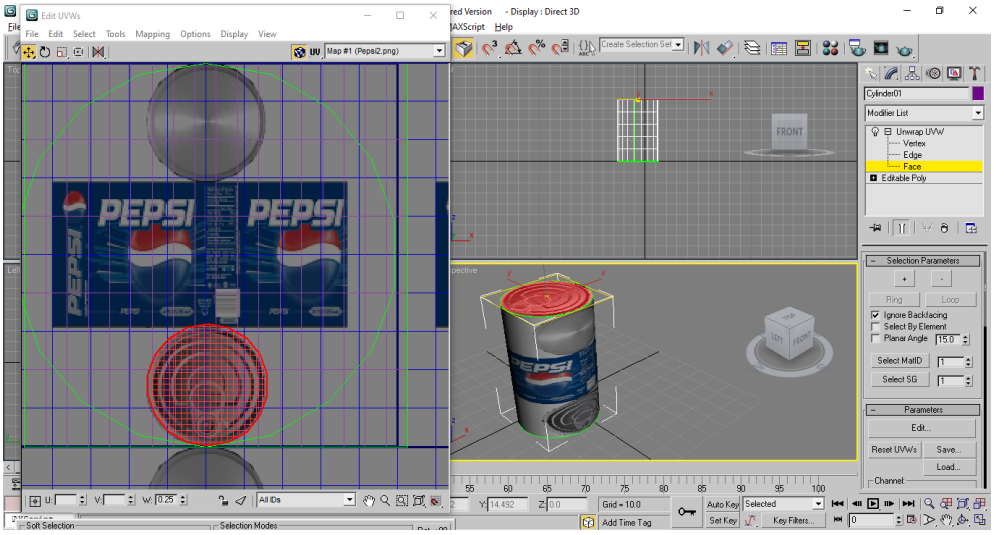
To add a material that is shown in the figure to a cylinder, the following steps are required:

1- Convert the cylinder to editable poly to have better recognition to its faces.
2- Assign the material to the cylinder using material editor.
3- From modifier list, choose Unwrap UVW map
4- Choose Edit from the modifier properties. Edit UVW window that is used to assign the material will be opened, change the checker pattern to the material that is chosen in 2. It will be shown in the figure.



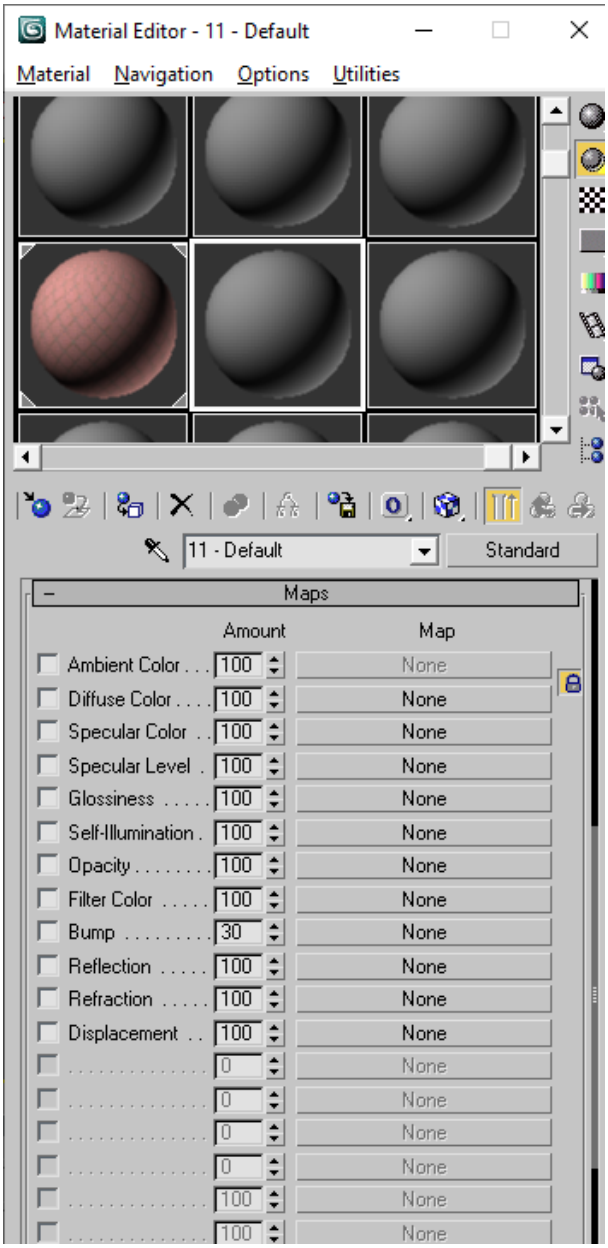

5- Select Face from Unwrap modifier and select the top cylinder face a circle will be appeared in the Edit UVW window, right click and choose detach edge verts and scale the circle down using the scale tool to be as the size of the top circle in the background material, move it using the move tool in Edit UVW window to be in the right place as shown in the figure.
6- Repeat the same steps for the bottom of the cylinder and its sides.


Edit UVWs
File Edit Select Tools Mapping Options Display View
Map #1 (Pepsi2.png)
PEPSI
PEPSI
FRONT
Cylinder01
Modifier List
Unwrap UVW
Vertex
Edge
Face
Editable Poly
Selection Parameters
Ignore Backfacing
Select By Element
Planar Angle
Select MatID
Select SG
Parameters
Edit...
Reset UVWs
Save...
Load...
Channel
Soft Selection
Selection Modes
Grid = 10.0
Auto Key
Selected
Set Key
Key Filters...
Add Time Tag

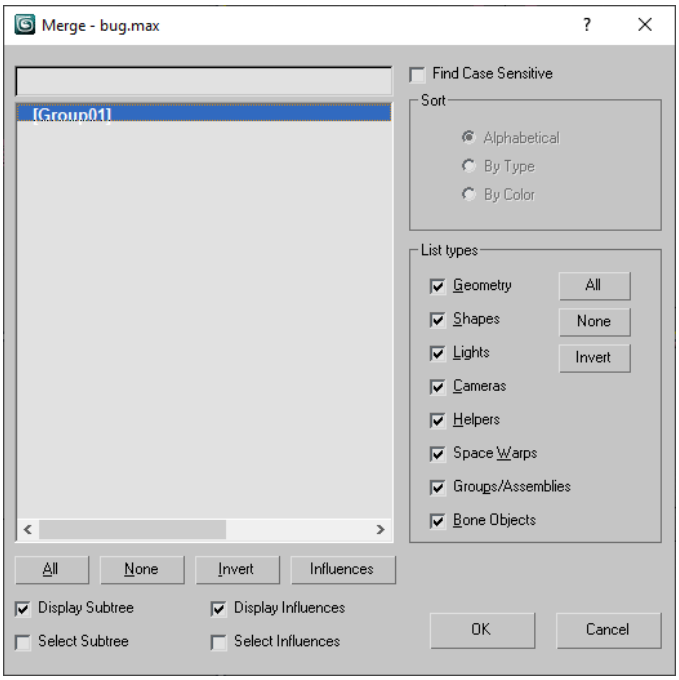

Edit UVWs
File Edit Select Tools Mapping Options Display View
Map #1 (Pepsi2.png)
PEPSI
PEPSI
FRONT
Cylinder01
Modifier List
Unwrap UVW
Vertex
Edge
Face
Editable Poly
Selection Parameters
Ignore Backfacing
Select By Element
Planar Angle
Select MatID
Select SG
Parameters
Edit...
Reset UVWs
Save...
Load...
Channel
Soft Selection
Selection Modes
Grid = 10.0
Auto Key
Selected
Set Key
Key Filters...
Add Time Tag

# Notes about Materials:

1- To add reflection to a material, check the reflection in MAPS from material editor and set it to Raytrace.
2- To add bump material that show the texture of the material, check on bump and choose the same image that is used in the material editor.
3- Opacity is used to give the object transparency.
4- Values next to each indicates to the strength of each command.



**Merge Scenes :** To merge a scene go to File → Merge and open the target max file. Choose the required objects and press Ok.




Note: It is preferred to open the scene individually before merging it to check the required objects.