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INTRODUCTION

Over the course of the first semester, the author was tasked to produce specific 3D models which would help develop skills in 3D modelling. The models tasked to produce were a dumpster, lamppost, cup and saucer, soda can and a house. Each of the models required the author to learn a new set of tools, building on the knowledge of 3D modelling as more models were developed.

03/10/25- MAYA TUTORIAL

At the start of the semester, the first task given was to set up the main software that would be used for the duration of the course and to then complete the interactive in-app tutorial. This software is Maya, a 3D modelling software used to create high quality 3D models, environments and visual effects.

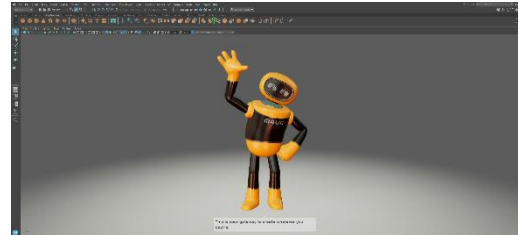


Figure 1, Opening screen for Maya's Interactive In-app Tutorial.

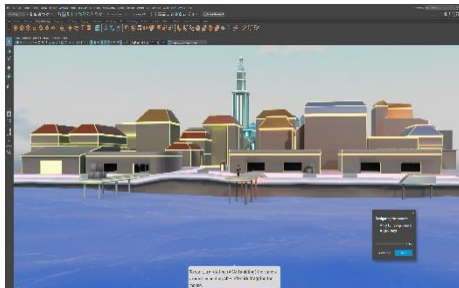


Figure 2, Movement section of tutorial.

The interactive tutorial had a duration of 10 minutes, covering the basic functions such as movement, frame selection and object manipulation (move, rotate, scale). It opened showing the user how to move around by having them rotate behind the robot and finding him in a short game of hide and seek. This was then followed up with

a short tutorial on the frame tool. Having the user select various cubes, using the frame tool to focus the camera on the object. Upon finishing the tutorial, the user was presented with the challenge of locating and stacking 6 cubes in a specific location using the combination of the movement tools. While completing this tutorial, challenges were faced understanding how to use the movement tools due to a first time using the software. This included restriction with the movement, due to not understanding how to fully view all angles of the model, whether that was too far away or phasing into the object. This was overcome by staying persistent and fully completing the tutorial to ensure a full understanding of the fundamental skills of Maya before progressing further independently. The tutorial fully addresses all these issues, breaking down each feature of the movement tools and how to utilise them. Upon successful completion of the tutorial, all the camera movement tools, the selection tools (move, rotate, scale) and the frame selection tool were successfully learnt, giving the knowledge needed to progress.

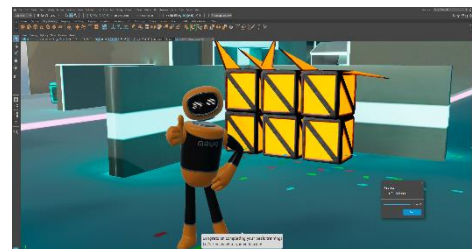


Figure 3, Object manipulation (move, rotate, scale) and frame tool tutorial.

10/10/25- DUMPSTER ASSET

Upon successful completion of Maya's interactive tutorial, the first task was to create a dumpster asset. This was supported with a tutorial from the lecturer, breaking down each step of the modelling process. After this the task was given to produce the dumpster asset independently based upon the new skills that were taught. These new skills were extruding, multiple face selection and mirroring, which played a massive role in producing this asset. Multiple face selection allowed the user to execute tasks on multiple face of an object at once. Extrude helped to add polygons onto an object, which could be done by selecting any edge, face or vertices based upon what was trying to be achieved. While the mirror tool allowed for only one half of a symmetrical model to be produced, as the mirror tool would perfectly mirror what's been designed on the other side of the model.

Reference image:



Figure 4 Dumpster reference image.

Development process:

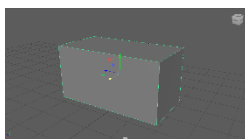


Figure 5, start of asset.

Imported polygon cube, then used scale tool to extend cube and increase overall size to match the scale of dumpster reference.

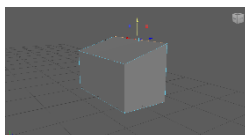


Figure 6 Move.

Used edge tool to select back edge, then move tool to raise the back wall.

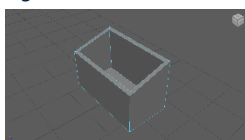


Figure 7 Extrude.

Extruded top face, then increased offset to create edge. Then extruded inner face and lowered it into the dumpster. Then the author used the scale tool to flatten surface.

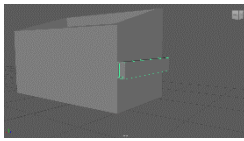


Figure 8 Bin handle.

The author created a new polygon cube, scaled to the width of the dumpster. Then extruded front and back face creating dumpster handle.

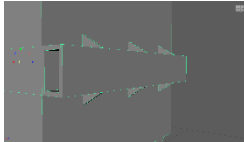


Figure 9 Final handle.

Flattened new polygon cube, used vertex mode to create a prism. Placed across handle accordingly to match reference image.

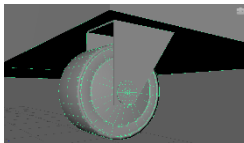


Figure 10 Wheel.

Created wheel asset and bracket separately. Then combined them together and duplicated to opposite side.

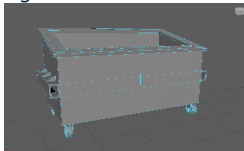


Figure 11 Mirror.

Used mirror tool to mirror object's assets to the other side.

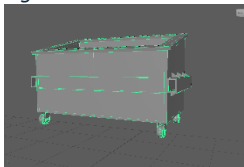


Figure 12 Top extrusion.

Extruded top face of the dumpster outwards and increase height.

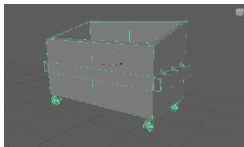


Figure 13 Detail added.

Added details to the dumpster such as lining and grooves.

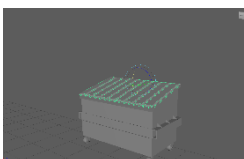


Figure 14 Lid construction.

Constructed the lid using tools such as connect and extrude. Then aligned the lid to sit where it would on the dumpster.

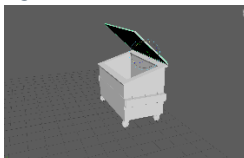


Figure 15 Attaching lid.

Pivot point was set where lid would rotate. Parented the lid to the dumpster. Then set rotate limits so that the lid lifted naturally without phasing through bin.

Final product:

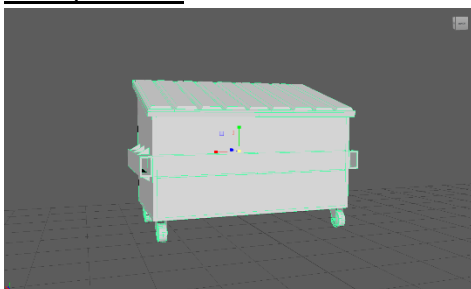


Figure 16 Final bin model.



Figure 17 Final bin model (wireframe view).

While modelling the dumpster, there was difficulty figuring out how to mould the lid of the dumpster. As previous attempts by the author did not match the appearance of the reference image. This was addressed using a YouTube video [18] which walked the viewer through the production of a dumpster asset step by step. The video broke down where the error was made and showed the best way to approach making it. Upon watching the video, the dumpster's lid was attempted again, with the final design being successful. The video taught the user how to effectively use the connect tool, making the production of the lid far simpler as it allowed for the base of the lid to be reconnected, creating a flat surface to be placed onto the dumpster itself.

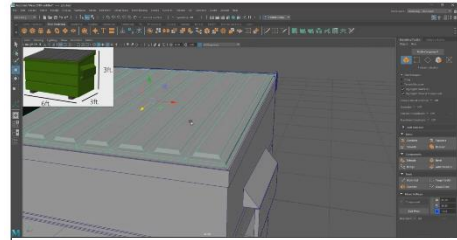


Figure 18 YouTube tutorial.

17/10/25- LAMP-POST ASSET

The next asset that was tasked to be produced was a lamppost. This was supported by a complete walkthrough by the lecturer, teaching the use of new tools and how to appropriately apply them to future work. After the tutorial, this was followed by an independent attempt of the lamppost. The tools that were taught to be used were combine mesh and the bridge tool. Combine mesh allowed the author to take two or more polygons and merge them into one asset. While the bridge tool allowed for two separate assets to be connected by a bridge, which could be altered with curves and bends dependant on the placement of the other asset and what curve the author wished to produce.

Reference image:



Figure 19 Lamppost reference.

Development process:

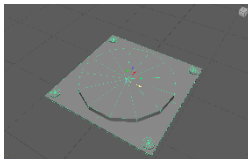


Figure 20 Base design.

The author flattened a cube asset, creating the lamppost base. Then the bolts by flattening a polygon cylinder and placing it on the cube.

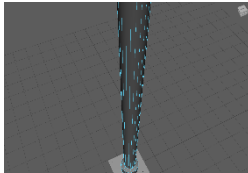


Figure 21 Post.

A polygon cylinder was attached to the base, extruded to create the shape, then selected top faces and extended post to the correct height.

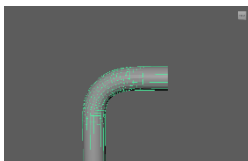


Figure 22 Post curve.

A new polygon cylinder was inserted horizontally from the post, then bridged the two assets to create the curve.



Figure 23 Pole Extension.

Extended the new cylinder to match the length in the reference image.

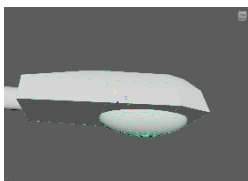


Figure 24 Lamp.

Inserted polygon cube and inserted edge loops, then moulded the cube to create shape of lamp, supported by extruding to create top. Sliced polygon sphere in half and moulded to correct shape.

Final product:



Figure 25 Final Lamppost Design.

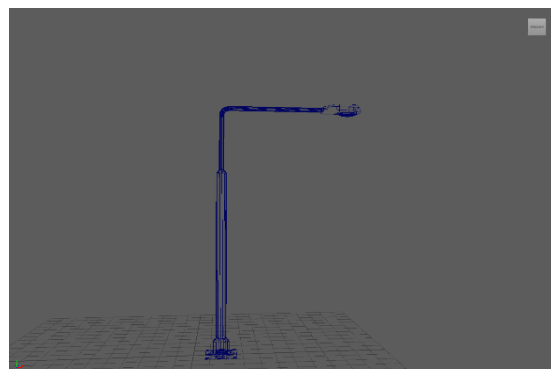


Figure 26 Final Lamppost Design (wireframe).

During the production of the lamppost asset, there was challenges faced when attempting to connect the head of the lamp to the end of the post, which was caused by a difference in scale of the two objects. This was corrected by simple trial and error; altering the scale and lining the two up, then repeated until the two assets fit perfect.

24/10/25- CUP & SAUCER ASSET

The cup and saucer was the next asset to construct. This was aided by a demonstration from the lecturer as it involved the use of new skills; insert edge loop, and soft select. Insert edge loop allowed the user to split up faces on an object by adding a ring around the polygon, which was massively helpful in making specific shapes and detail. Soft select allowed the user to select one of the components of the polygon (faces, edges, vertices) organically. For example, when selecting a specific vertex and raising it that vertex will be the peak, while surrounding vertices in the radius will do the same while displaying a natural falloff.

Reference image:



Figure 27 Cup & saucer reference.

Development process:

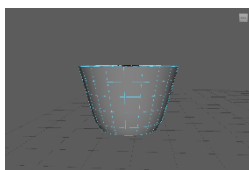


Figure 28 Cup body.

The author inserted a cylinder asset, then added edge loops so that the cup could be moulded.

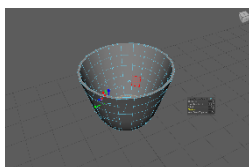


Figure 29 Extrude interior.

Extruded interior of the cup, which formed the inside of the cup.

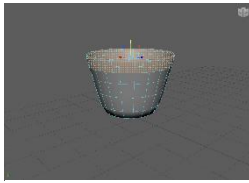


Figure 30 Smooth edges.

Smoothed out the top of the cup to round off hard edges.

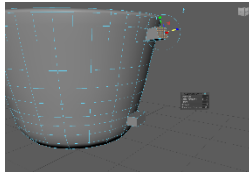


Figure 31 Extrude handle start points.

Extruded out two faces of the cup, creating the bases of the handle.

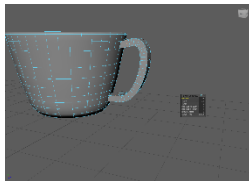


Figure 32 Bridge handle.

Used bridge tool to form the handle. Increasing values to form curve.

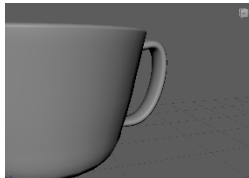


Figure 33 Smooth handle.

The author smoothed out the handle to round off any hard edges.

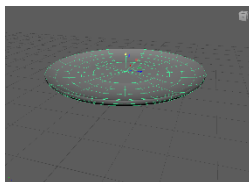


Figure 34 Saucer.

Created the saucer by flattening a polygon cylinder, then extruded and moved edges to curve the cylinder.

Final product:

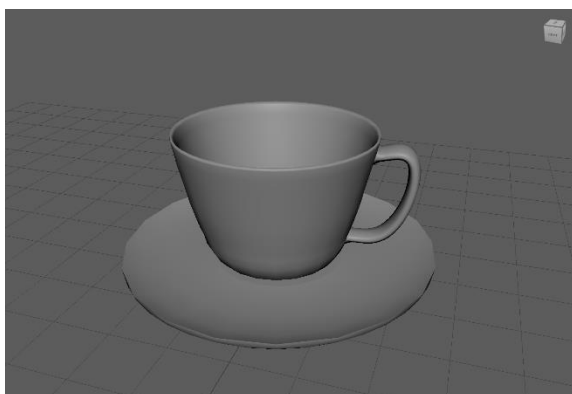


Figure 35 Finished cup and saucer asset.

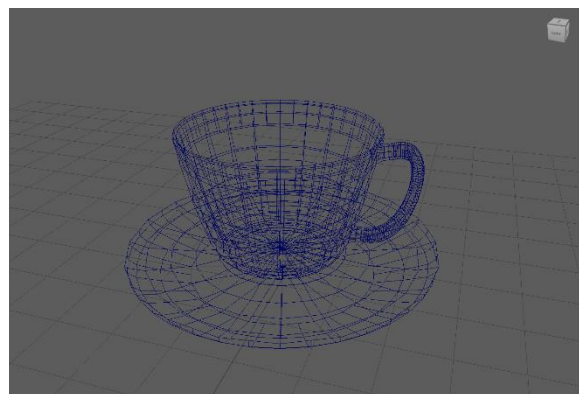


Figure 36 Finished cup and saucer wireframe view.

During the production of the cup and saucer, there was difficulty in attempting to create the handle of the cup. The first attempt included the use of separate polygon cubes, then

connecting them onto the cup. But this proved to look unprofessional due to gaps between the cup and the handle, and the two assets phased through each other. This was corrected by trial and error, as well as analysing a cup in person to see how the handle attached. This led to the use of extruding a face to make the starting point of the handle, then the author used the bridge tool to form the handle.

31/10/25- SODA CAN ASSET

The soda can asset was next to produce. A demonstration was given by the lecturer to show how to develop the can. This asset taught some of the most helpful skills in terms of furthering 3d models. These skills were Lambert, insert image, UV editor, Quad draw, cut and sew. Lambert allowed the user to modify the appearance of an asset by modifying the material of an asset within Maya. Lambert also allowed for images to be uploaded onto the model, creating a specific appearance. UV editor let the user modify assets from a 2D perspective. Quad draw was a beneficial tool in terms of cutting out specific shapes. It opened the possibility of uploading an image, then cutting out the item and turning it into its own asset. Cut and sew went hand in hand; cut let the user essentially separate areas of the asset, while sew allowed the user to attach assets back together.

Reference image:



Figure 37 Soda can reference

Development process:

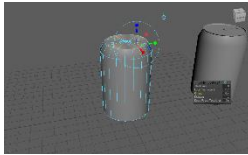


Figure 38 Extrude top of can

Imported a cylinder polygon, extruded the top face, then set offset to 0.4 and pulled top face upwards, creating the neck of the can.

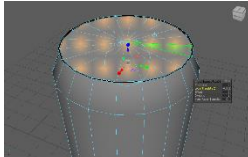


Figure 39 Second face extrude

Extruded the top face, setting values to offset -0.1, divisions 3, thickness 0.05. This created the rim of the can.

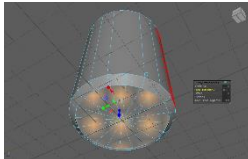


Figure 40 bottom face extrude

Extruded bottom face, set values to offset 0.3, local translate Z 0.313.

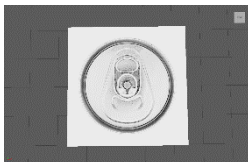


Figure 41 Lambert ring pull

Inserted polygon plane, then selected lambert. Selected colour then choose file. Chose the file icon then found the designated image. Pressed "6" to see the image on the plane, then made the object live.

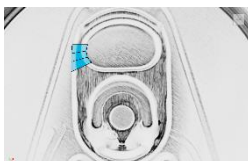


Figure 42 Quad draw

Selected the quad draw tool. Placed the first 4 points then clicked shift to create the first polygon. Repeated until entire ring pull was created.

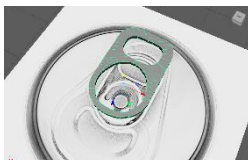


Figure 43 Extrude ring pull

Selected the created ring pull, then extruded to make it 3d.

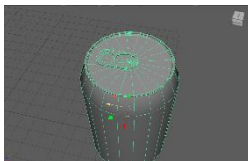


Figure 44 Connect ring pull to soda can

Aligned the ring pull on the surface of the can accordingly. Then selected both models and used combine to merge them into one asset.

Final product:

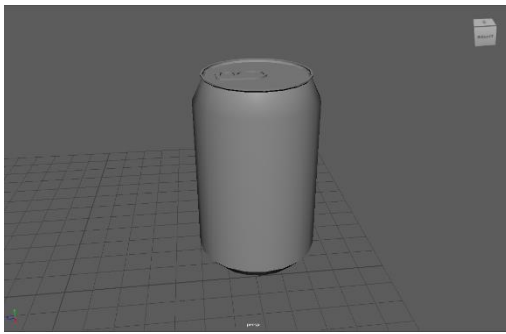


Figure 45 Final soda can

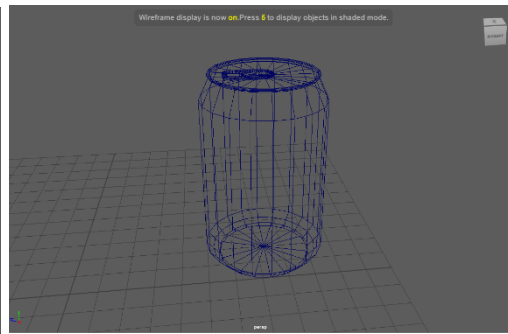


Figure 46 Final soda can (wireframe view)

The creation of the soda can would teach the author many beneficial skills, while still providing difficulty. The main difficulty faced was figuring out how to create the shape of the ring pull. Upon recommendation of the quad draw tool, the Autodesk help website [47] was used to understand how the tool works. Upon reading through the page and practising, the ring pull was successfully created and added on to the soda can. If any improvements were to be made by the author, it would have been using UV unwrap to add the label onto the can, as it would have improved the accuracy of the model.

14/11/25- HOUSE ASSET

The final asset to design was the house. This required the use of the most skills learnt up to that point, essentially working as a final challenge. The tools used for the house were scale, extrude, multi cut tool, combine, standard surface and insert edge loop.

Reference image:



Figure 48 House reference image

Development Process:

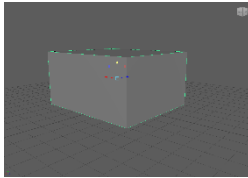


Figure 49 Starting cube

The author inserted a polygon cube, scaling it accordingly to the size of the house reference.

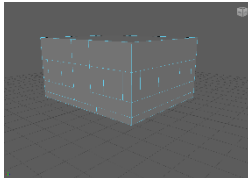


Figure 50 House edges

A combination of the multi cut tool and insert edge loop tool was used to map out the features of the house such as the door and windows.

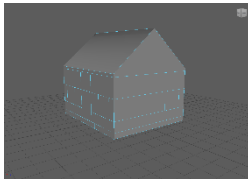


Figure 51 Roof extrude

An edge was placed across the top of the house. The author then extruded the top face to the correct height, then pulled the front and back edge downwards to create the shape of the roof.

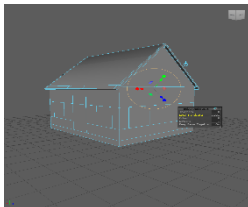


Figure 52 Roof shape

The slanted faces of the roof were then extruded respectively, increasing the thickness of the roof. Each of the faces at the end points of the roof were then extruded to extend the roof over the body of the house.

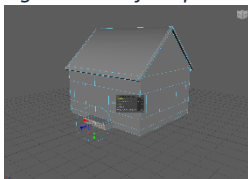


Figure 53 Top step

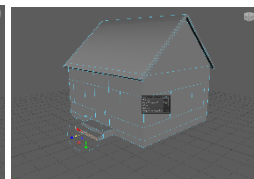


Figure 54 Bottom step

The steps to the house were created by extruding the designated face outwards. The author then used the multi cut tool on the front face of the step, then extruded the bottom half to create the bottom step.



Figure 55 Multi cut window



Figure 56 Window frame fix

The outline of the window was created using the multi cut tool. The author then went over the window frame, flattening out each point of the frame.

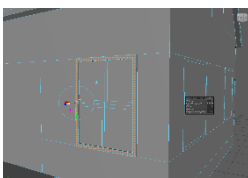


Figure 57 Window frame extrude

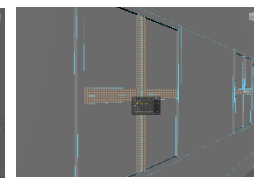


Figure 58 Window grille extrude

The author extruded the window frame outwards from the house to give depth. The same was done with the grille, with a decreased distance.

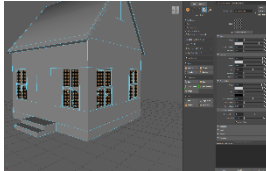


Figure 59 Standard surface tool

The windowpanes were then highlighted, followed up by selecting the standard surface tool. The required attributes were input by the author, giving the faces the appearance of glass. The author repeated this method for each of the respected windows.

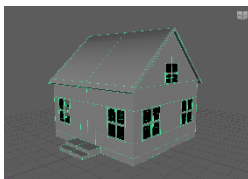


Figure 60 Top window

The author used the multi cut tool to map out the top window. The method used for the windows was repeated to create the top window.

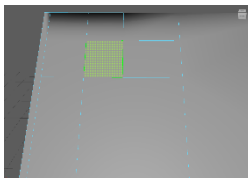


Figure 61 Chimney base

The multi cut tool was used to map out the chimney. The author then extruded the designated face, followed by the scale tool to flatten the face. This was then extruded again and raised upwards to create the chimney.

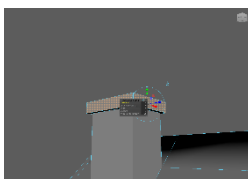


Figure 62 Chimney extrude

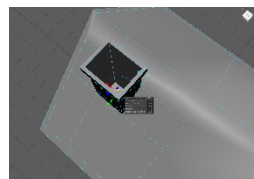


Figure 63 Hollow inside chimney

The author then extruded the top row of faces on the chimney and increased the thickness to 0.08. The top face was then extruded downwards which created the interior of the chimney.

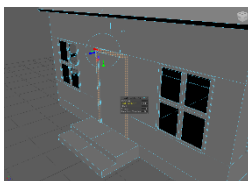


Figure 64 Doorpost

The outline of the door was created by the author using the multi cut tool and removing unnecessary edges. The front face was then highlighted and extruded, setting local translate Z to 0.033.

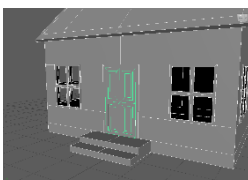


Figure 65 Door creation

The author then removed the inner face of the door, and created a new polygon cube, scaling it to the required size. The multi cut tool was then used to evenly split the front face into four faces. The author then extruded the four faces, setting keep faces together to no and

increasing the offset to create the pattern of the door. The author then lined the door up inside of the door frame.

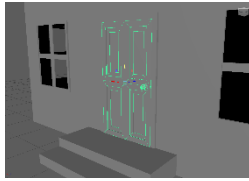


Figure 66 Doorknob creation

The doorknob was created by inserting a polygon cylinder and scaling it to the size of the base of the doorknob. The centre face was then extruded and extended upwards.

A polygon sphere was then scaled to fit on top of the cylinder. Once the sphere was placed accordingly, the author removed the bottom of the sphere so that it was attached to the cylinder with a flat surface.

Final product:

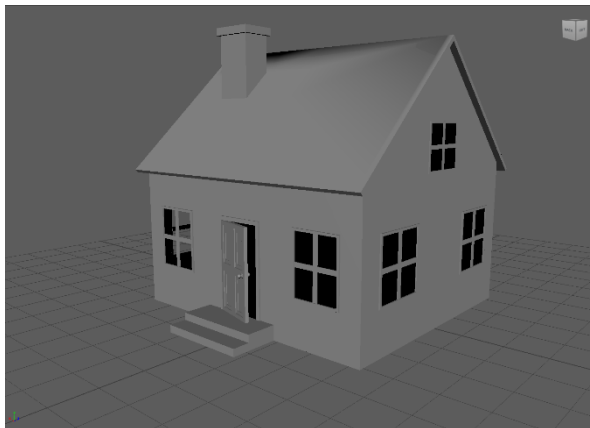


Figure 67 Final House asset

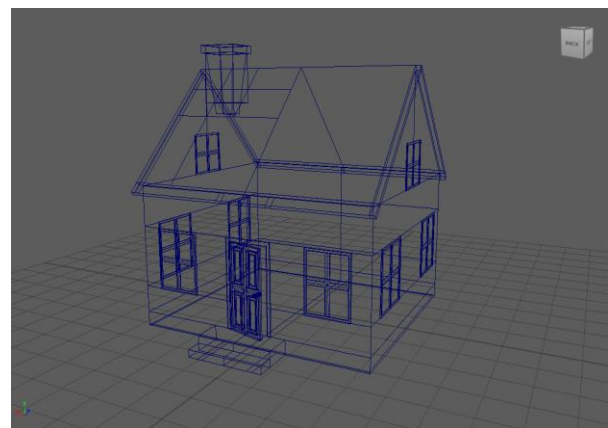


Figure 68 Final House asset (Wireframe view)

The creation of the house provided the greatest challenge to the author, while providing the most knowledge by the end of production. The greatest challenge faced during production was the creation of the roof. This was because the author could not get the shape of it right, resulting in further difficulty trying to raise the roof upwards. This was corrected with a further tutorial from the lecturer demonstrating where the error was made. This demonstration allowed the author to efficiently create the roof, improving the accuracy of the model compared to the reference image. If any improvements were to be made by the author, it would have been taking initiative and producing the interior of the house, as it would have added more depth to the model.

REFLECTION

Upon completion of the 3D modelling tasks covered in the first semester, the author's understanding of 3D modelling advanced massively compared to the start of the semester. The author was taught a range of skills related to movement, object manipulation, object material, and importantly critical thinking. The skills taught set the foreground of 3D modelling for the author, enabling the authors skills to advance further as time progresses.

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