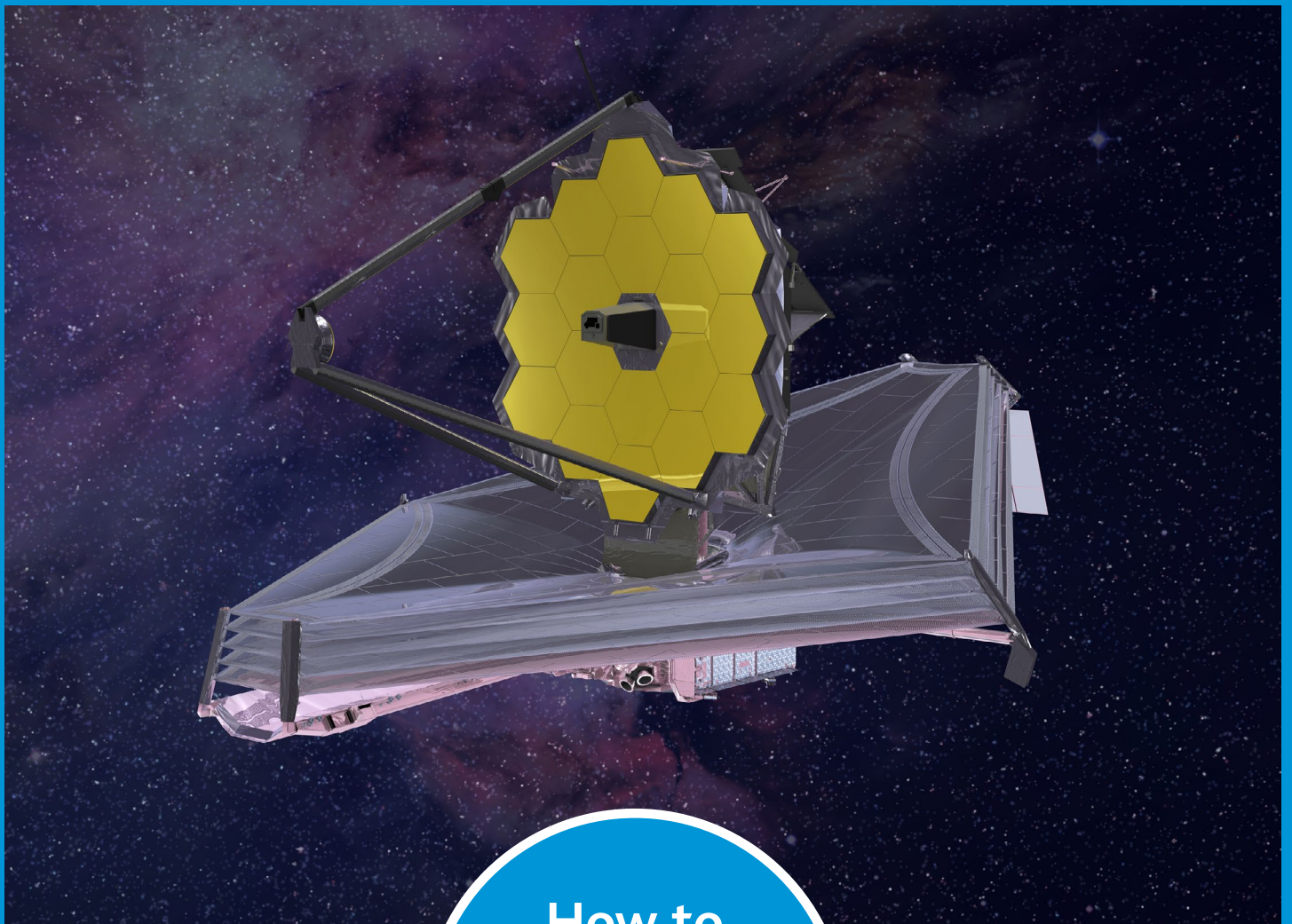


Introduction to Fusion 360 | Beginner



How to
model the
James Webb
Telescope

10 Steps to Space | Handout

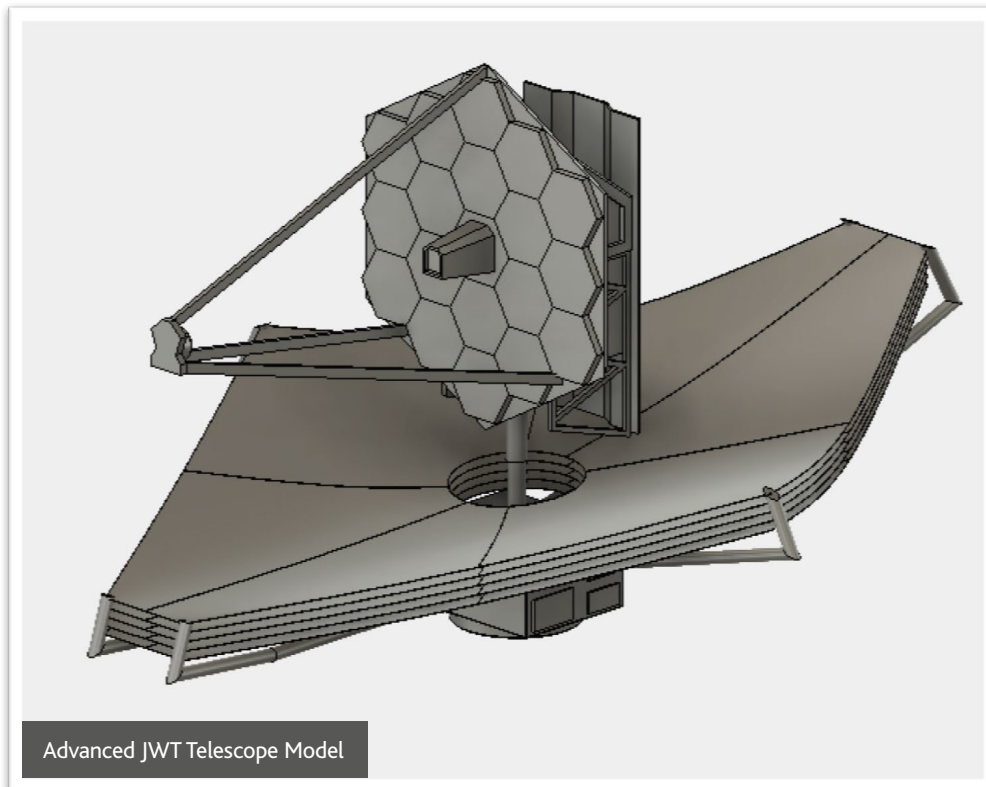
What is the James Webb Telescope?

The James Webb Space Telescope will be the premier space observatory for astronomers worldwide, extending the discoveries of the Hubble Space Telescope.

It will be the largest telescope EVER placed in space; 100 times more powerful than the Hubble Telescope. So big, the telescope has to fold origami-style to fit into the rocket. It will then unfold like a 'Transformer' in space.

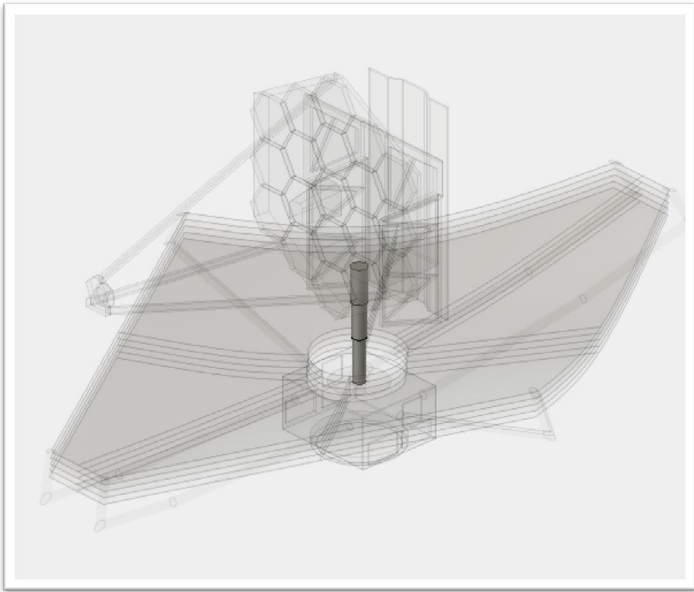
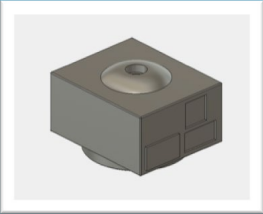
Has a 5-layer sunshield that protects the telescope from the infrared radiation of the Sun (like having sun protection of SPF 1 million) It will peer back in time over 13.5 billion years to see the first galaxies born after the big bang.

Will orbit the Sun 1.5 million kilometres from the earth. Will launch from French Guiana in 2019.



How will I model the Telescope?

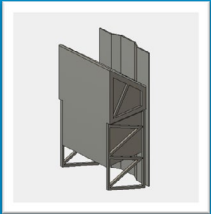
10 Steps to Space – Model, Render, Animate, & Draw

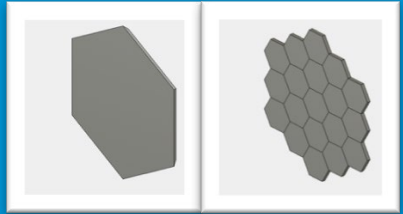
Step 1 Spacecraft Bus



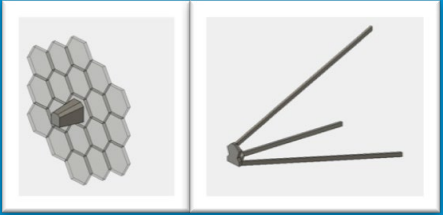
Step 2 Deployment Tower



Step 3 Science Module Instrument



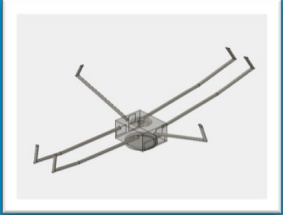
Step 4 Backplane Primary Mirror



Step 5 Aft-Optics Subsystem Secondary Mirror



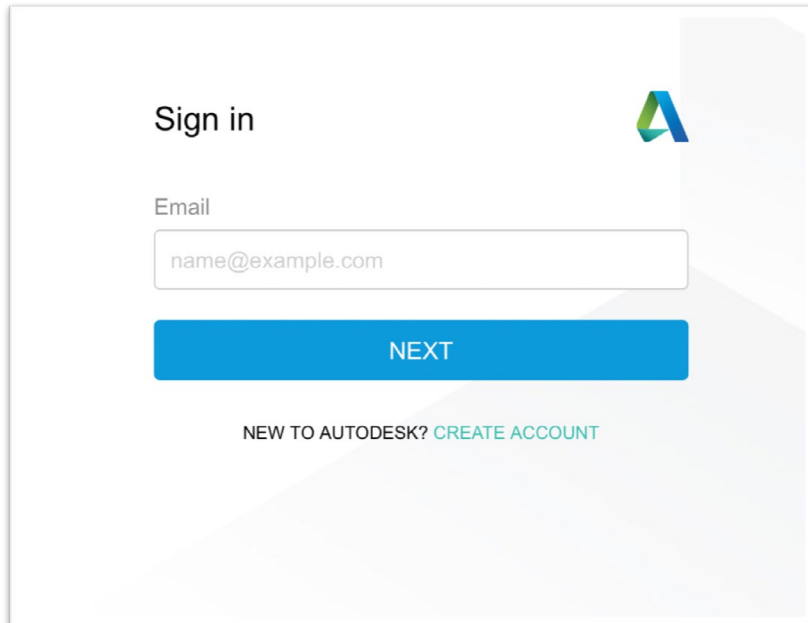
Step 6 Multilayer Sunshield




Step 7 Unitized Pallet Structure

Getting Started

Open Fusion 360, Sign in or Register



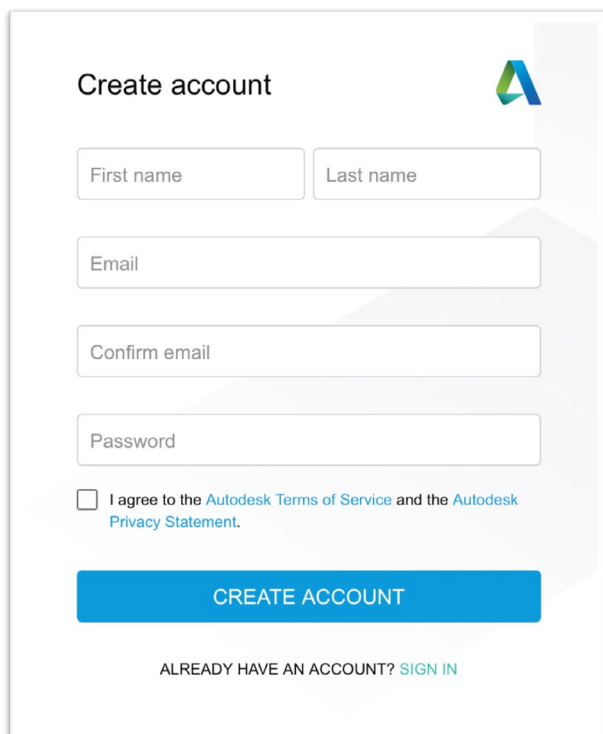
Sign in 


Email

name@example.com

NEXT

NEW TO AUTODESK? [CREATE ACCOUNT](#)



Create account 

First name Last name

Email

Confirm email

Password

I agree to the [Autodesk Terms of Service](#) and the [Autodesk Privacy Statement](#).

CREATE ACCOUNT

ALREADY HAVE AN ACCOUNT? [SIGN IN](#)


Getting Started

Lesson Objectives:

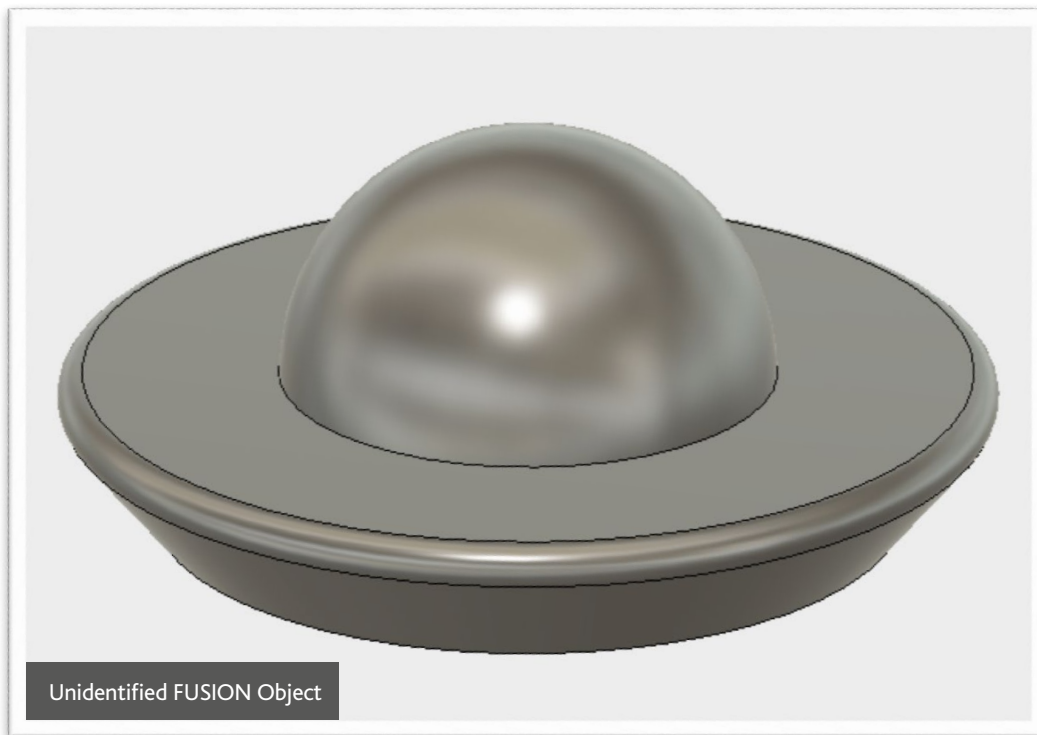
 Sign in to Fusion 360

 Create a New Sketch

 Create Lines and Circles

 Mirror, Dimension and Trim Tools

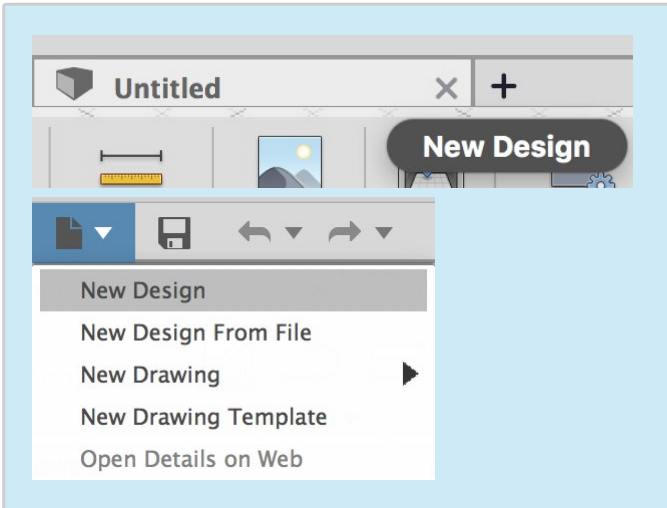
 Create a Revolve



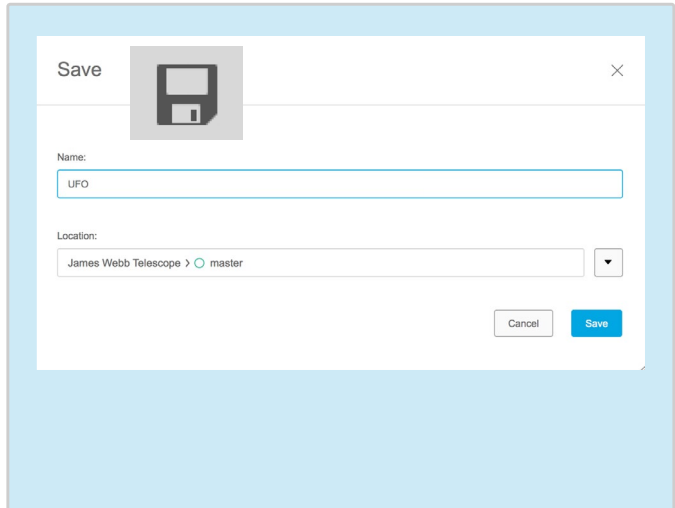
Sketches can be found in resources

Getting Started

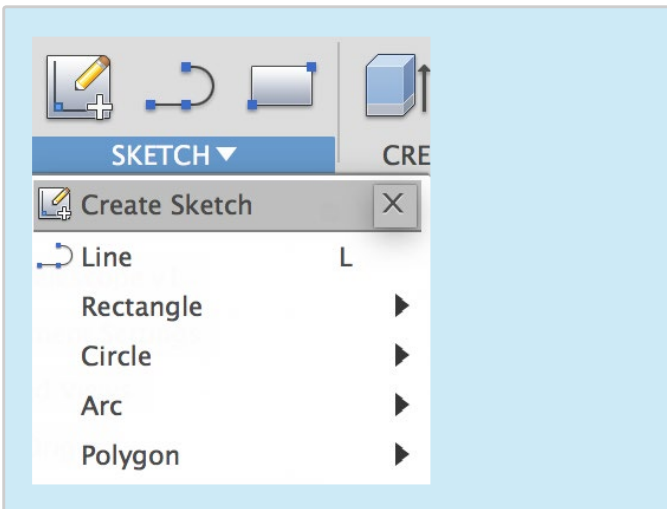
1 Create a new design by clicking the + above the toolbar or go to file.



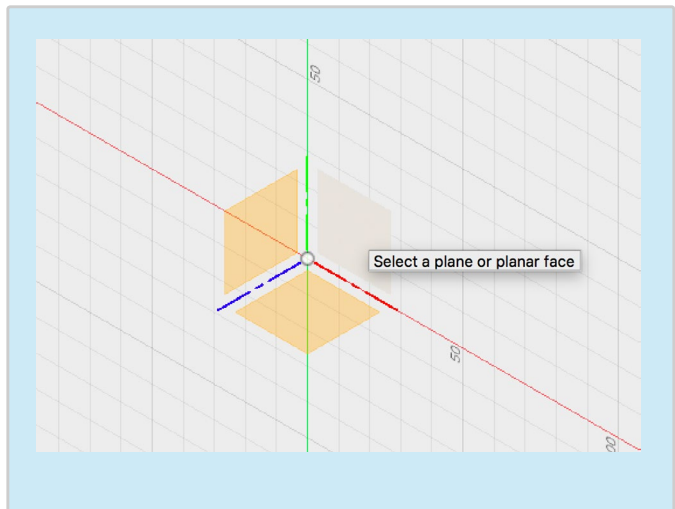
2 Save the new design, Name the file as UFO.



3 Start by creating a new sketch. Go to Sketch in the toolbar and then go to Create Sketch. Notice the little sketch icon next to create sketch.

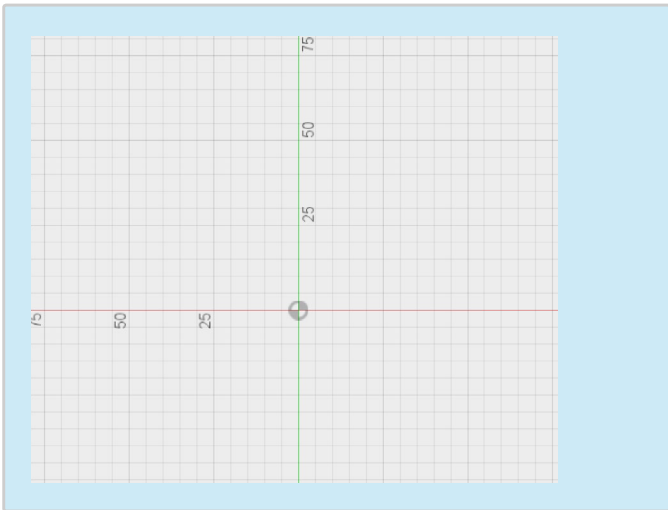


4 In the middle of the screen you should find 3 orange squares. These are called planes. The lines between the planes are called axis and the point in the middle is the origin. Select one of the side planes to sketch on.

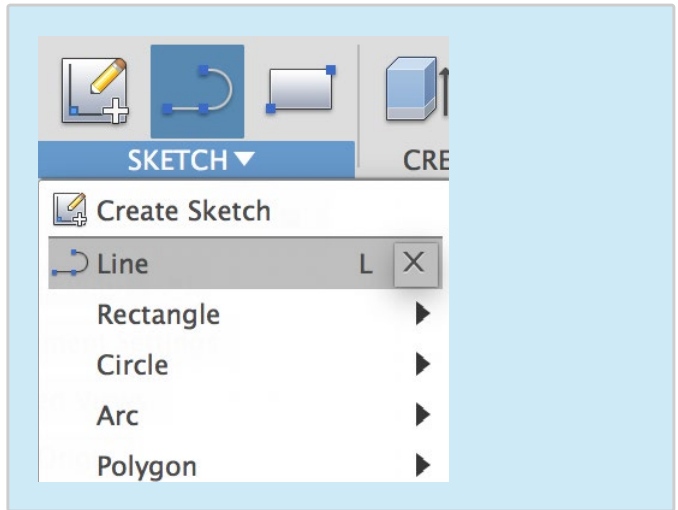


Getting Started

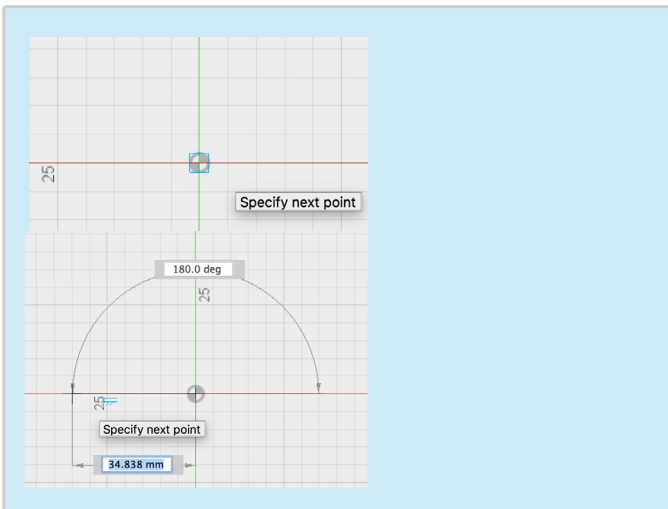
5 Notice how our view has changed on our view cube. We are now looking at a side view.



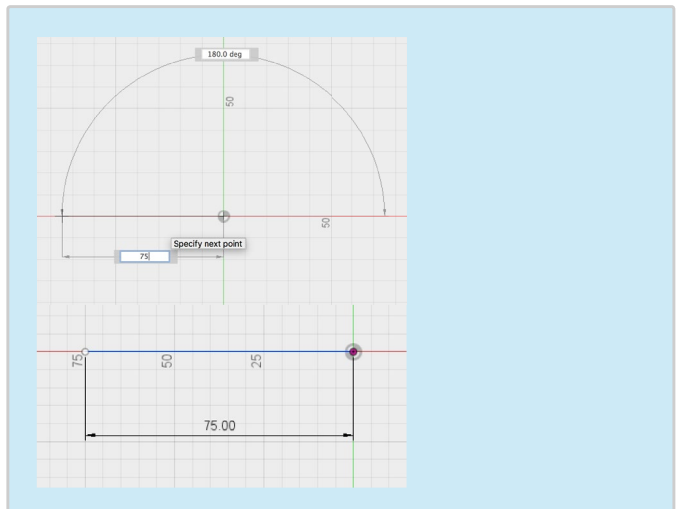
6 Go back up to the toolbar and click on the sketch drop down menu. Then select the line tool. Notice the L next to line. This is a shortcut. Press L on your keyboard to bring up the line tool.



7 To create a line, select the origin as the point you want to start the line from. Then move your cursor along the red axis. Notice the distance and angle of your line change as you move your cursor.

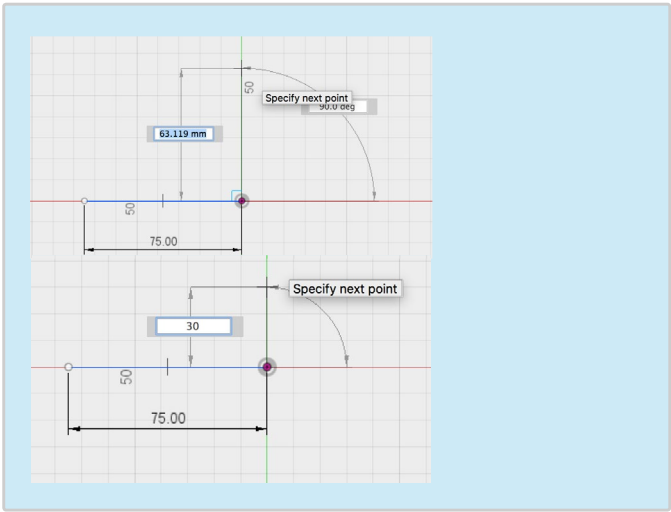


8 To dimension the line type in how long you want to make it. Make the line 75mm going along the red axis. Press enter on your keyboard to create the line. You can change the dimension by click on it.

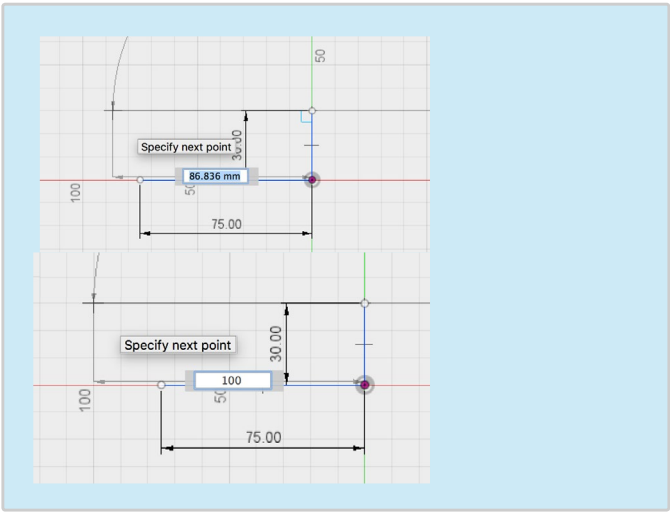


Getting Started

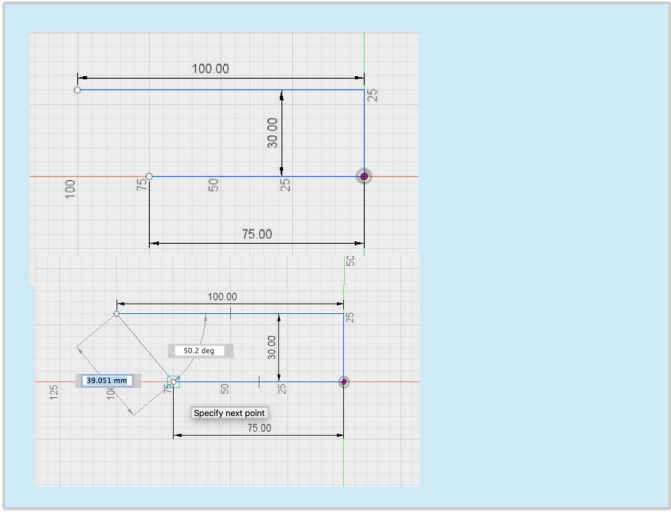
9 Create a new line by pressing L on your keyboard. Starting from the origin this time create a line going upwards by 30mm.



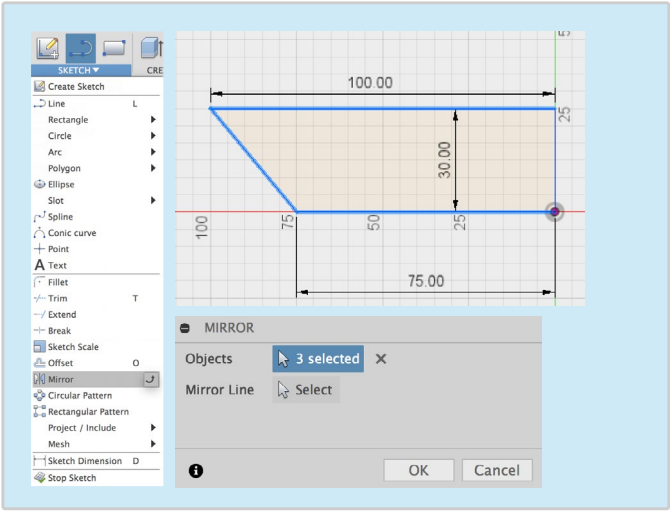
10 Create another line, this time from the top of the previous line. Make a line going outwards by 100mm, at a right angle to the vertical line.



11 Draw a new line, this time connect the two ends or the horizontal line together. Click one end and then the other to create the line.

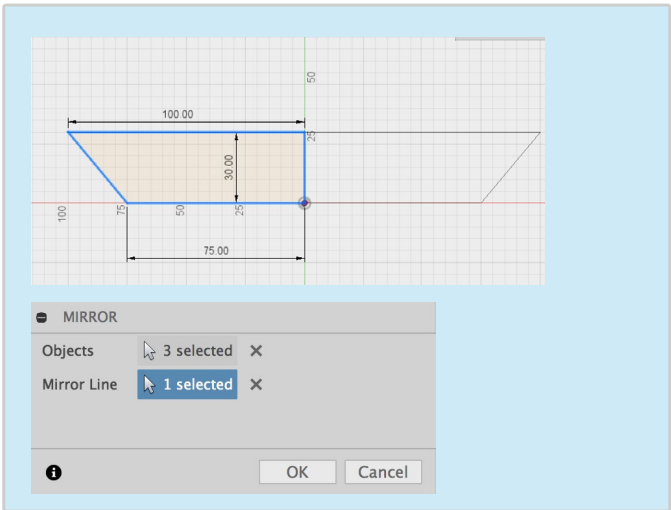


12 Go to the sketch menu and select the mirror tool. The menu will ask for an object and a mirror line. Click on object and select the two horizontal lines and angled line shown above.

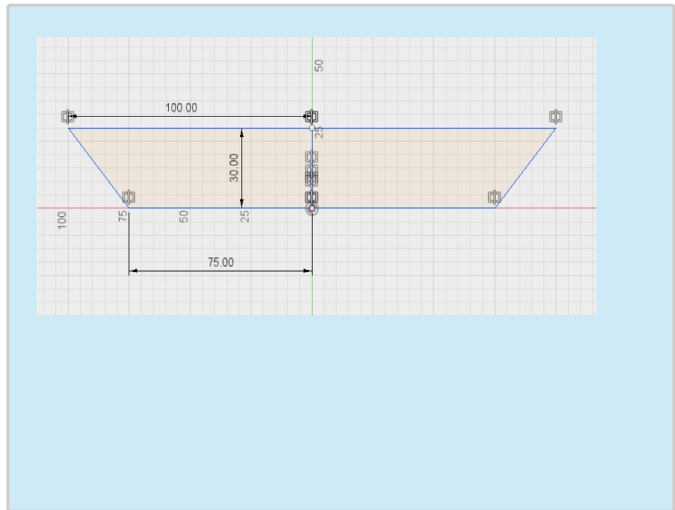


Getting Started

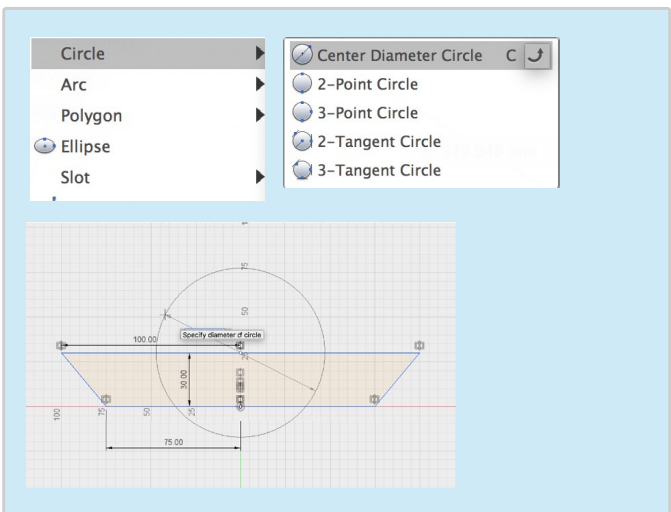
13 Then click on Mirror Line, Select the line you want to mirror the objects across. Select the horizontal line. Notice the lines are ghosted on the other side. Click OK.



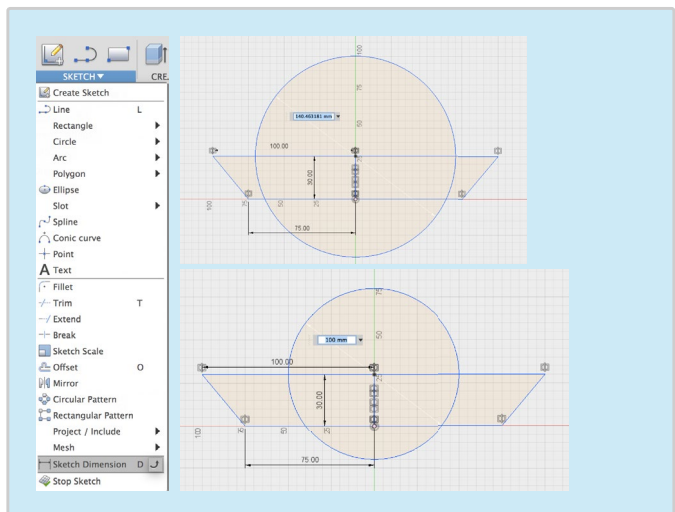
14 Using the mirror tool allows us to create only half a sketch, saving time. Anything you do to one side will now be mirror to the other side.



15 Go to the Sketch Menu and find the circle tool, Select a Center Diameter Circle from the menu. Select the top of the vertical line as the center. Then move your cursor outwards. Notice how the diameter changes. Make a random sized circle.

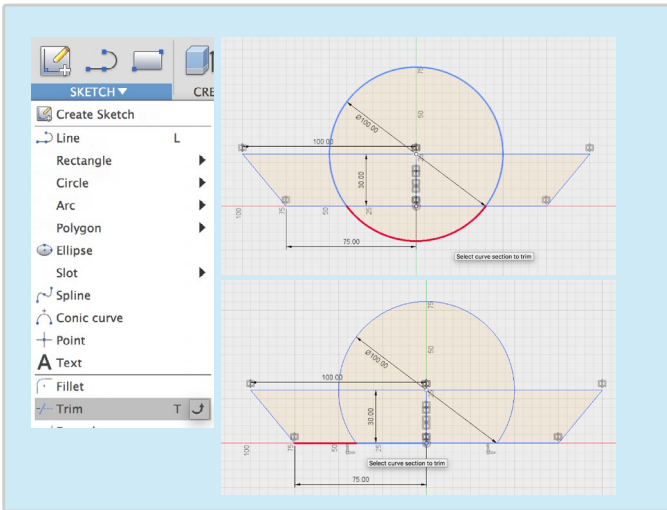


16 Go to Sketch, and then Sketch Dimension. Select the circle to dimension it. Once the circle is selected notice a ghosted dimension appears. Click again to edit the dimension to 100mm. Notice the size of the circle changes.

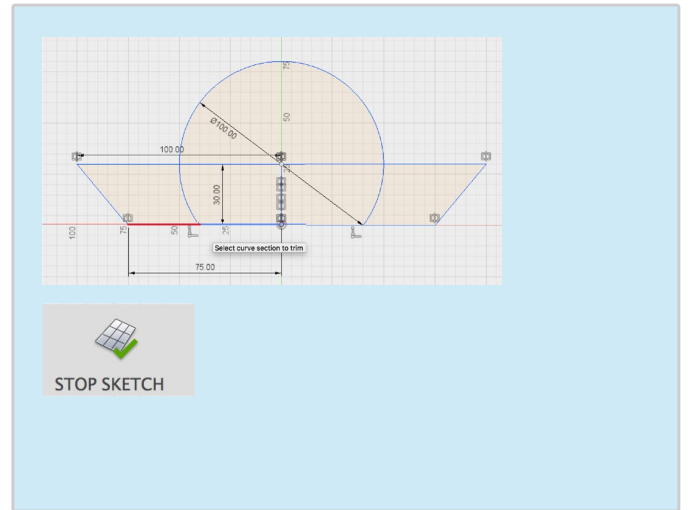


Getting Started

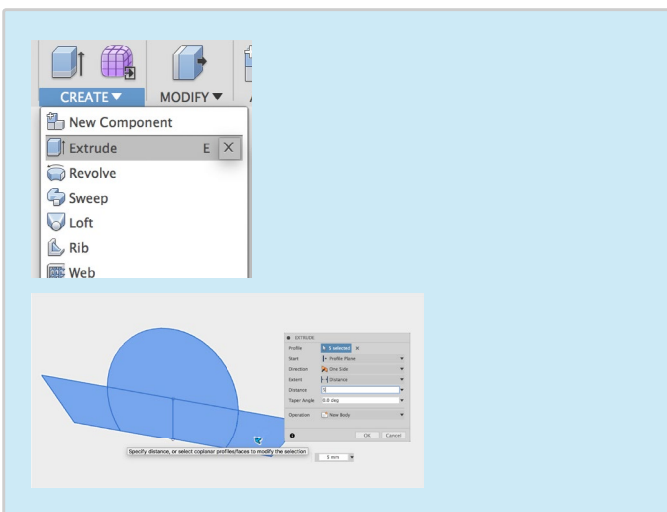
17 Go to Sketch, and then Trim. Notice the lines go red as move your cursor over them. Click on the bottom of the circle to trim the line as shown above.



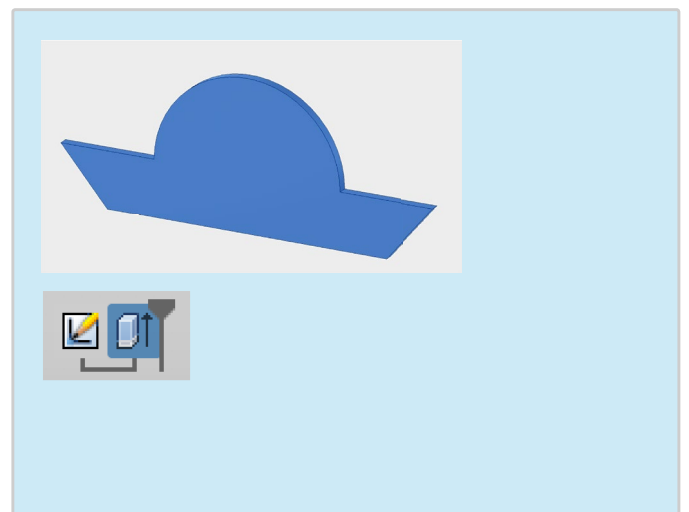
18 Once you're happy with your sketch, make sure you stop sketch, this can be found at the end of the toolbar.



19 Try turning your 2D drawing into a 3D model by going to Create and then Extrude. Select the different parts of your sketch or profile. Use the arrow to extrude the sketch or add a distance in the extrude menu.

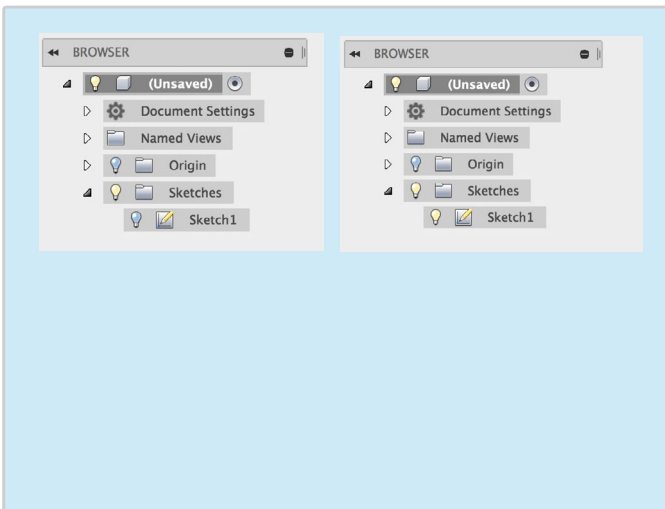


20 If you need to delete a feature like the Extrusion. Simply go to the timeline along the bottom and find the feature you want to delete. Click on the Extrude Icon, notice the model has been highlighted. Simply press delete or backspace on your keyboard to delete it.

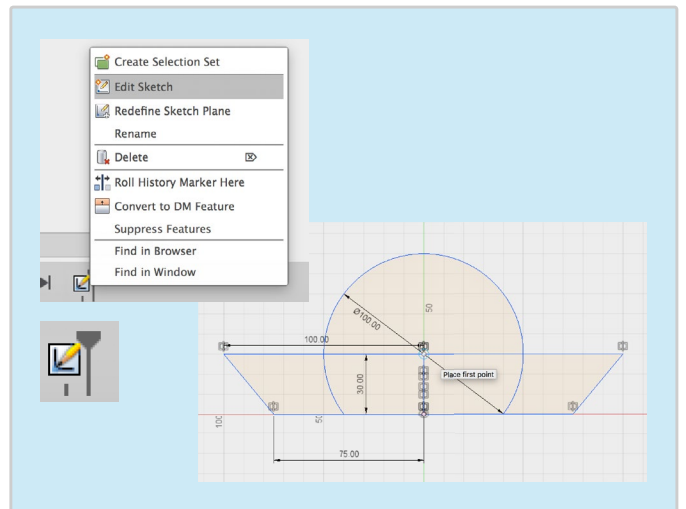


Getting Started

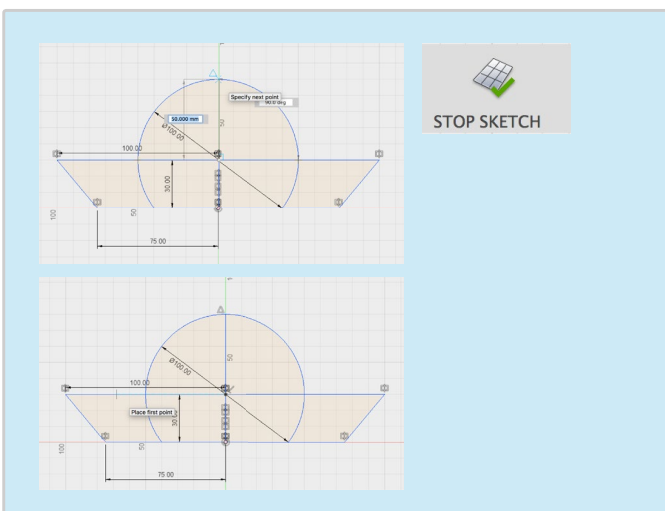
21 Notice that your sketch has disappeared. To find it go to your browser. Click on the arrow next to Sketches to reveal Sketch 1. To show the sketch click on the lightbulb.



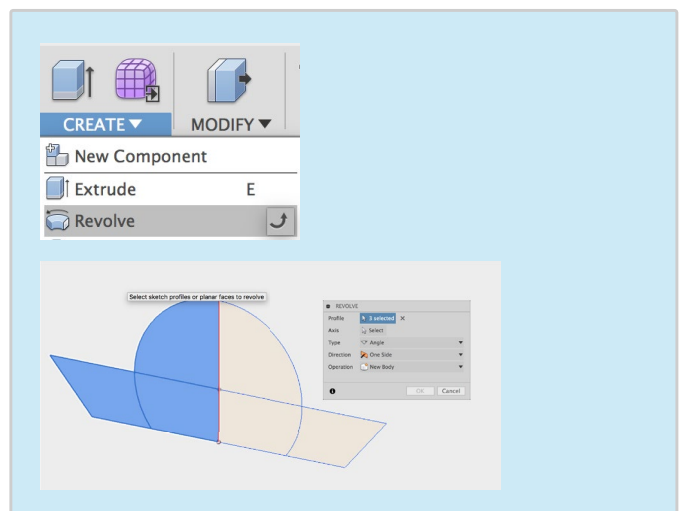
22 To edit a sketch or feature, simply find the feature on the timeline and double click or right click and go to edit sketch.



23 Draw a new line in the existing sketch, this time extend the existing vertical line upwards towards the top of the circle. Once you've finished, make sure to stop sketch.

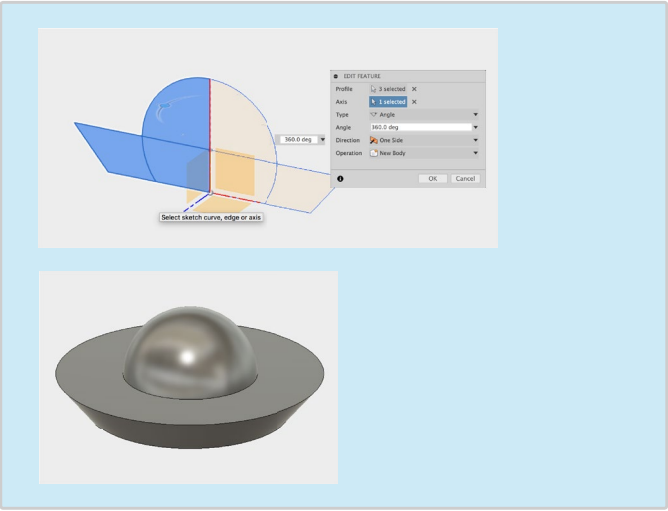


24 This time, instead of using the extrude tool, try using the revolve tool. Go to create and then revolve. The revolve tool will ask for profiles you want to revolve. Select one half of the sketch as shown above.

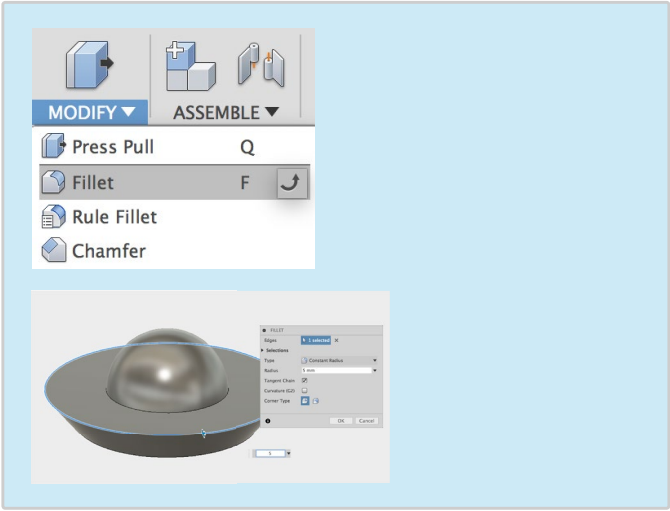


Getting Started

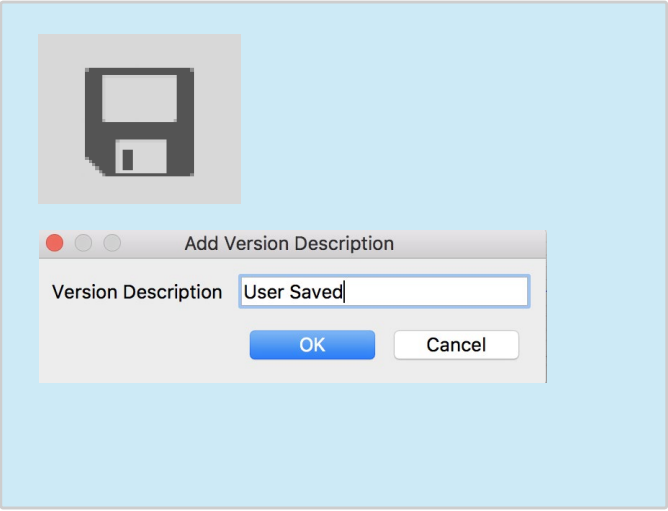
25 The revolve tool will then ask for an axis to revolve around. Click axis and then select either the green axis or vertical line on the sketch. Notice the profile has been revolved by 360 degrees.



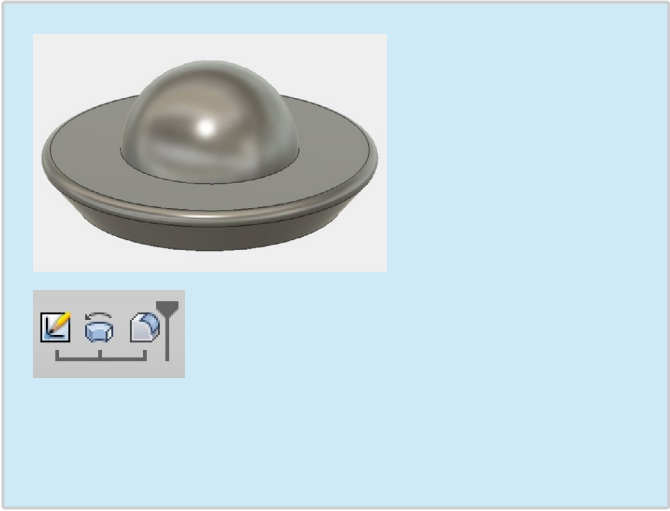
26 As well as creating bodies, we can also modify them. Go to modify and then fillet. This tool will ask for an edge to round off. Use the arrow or type in a radius to fillet the 1 edge.



27 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



28 UFO completed! Now you're ready to make the James Webb Telescope!



Step 1 Spacecraft Bus

Lesson Objectives:



Create a new sketch



Creating a Solid Body (Extrude and Revolve)



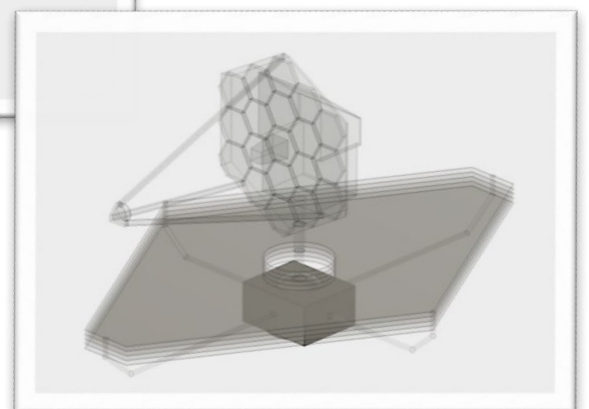
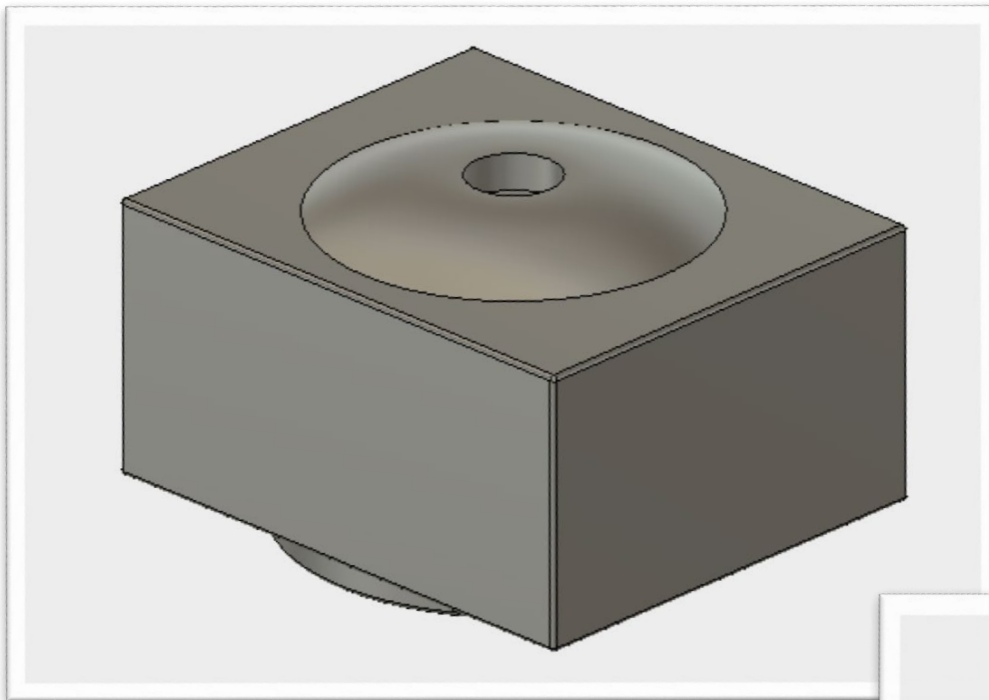
Modify Solid Bodies (Fillet & Rule Fillet)



Create a Hole

Spacecraft bus

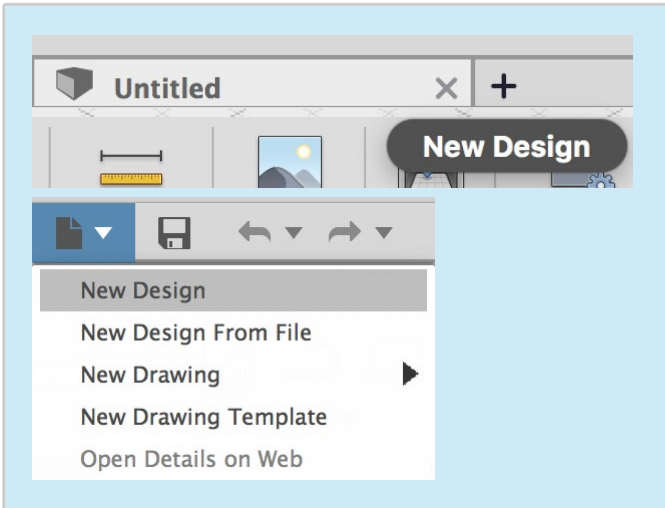
Contains most of the spacecraft steering and control machinery, including the computer and reaction wheels.



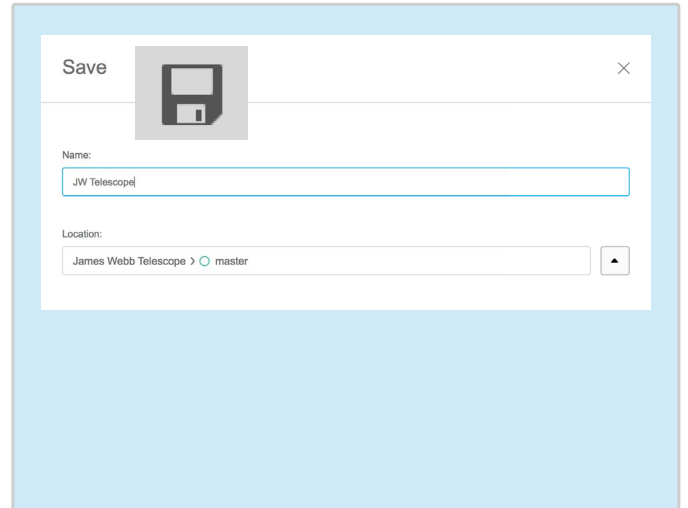
Sketches can be found in resources

Step 1 Spacecraft Bus

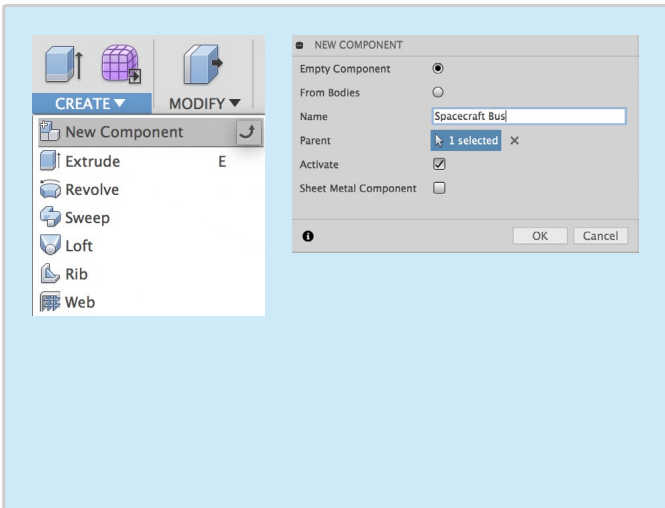
1 Create a new design by clicking the + above the toolbar or go to file.



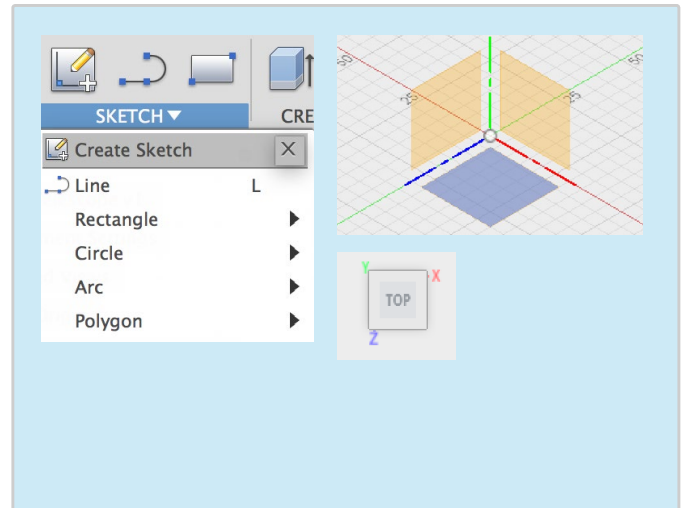
2 Save the new design, Name the file Telescope.



3 Rule 1 – Create a new component named Spacecraft Bus.

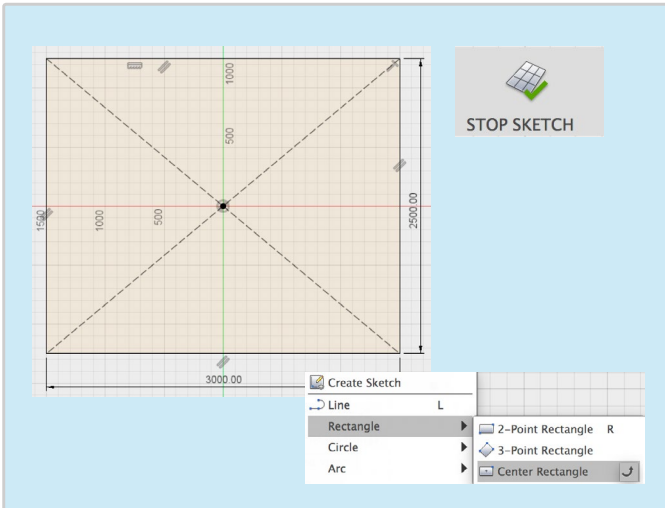


4 Create a Sketch on the bottom Plane as shown.

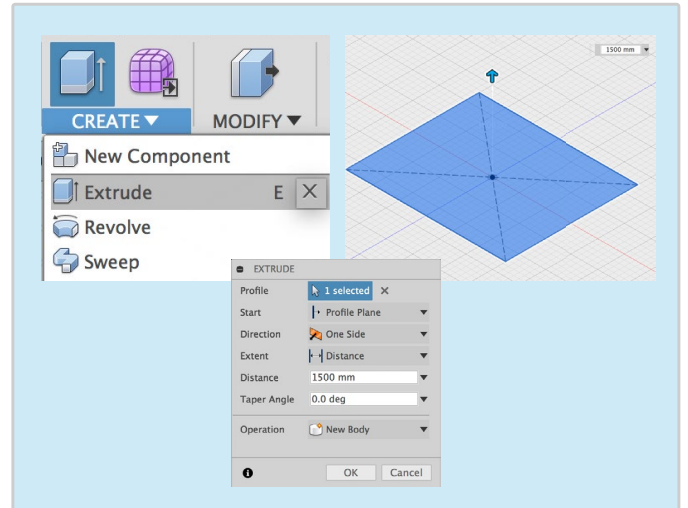


Step 1 Spacecraft Bus

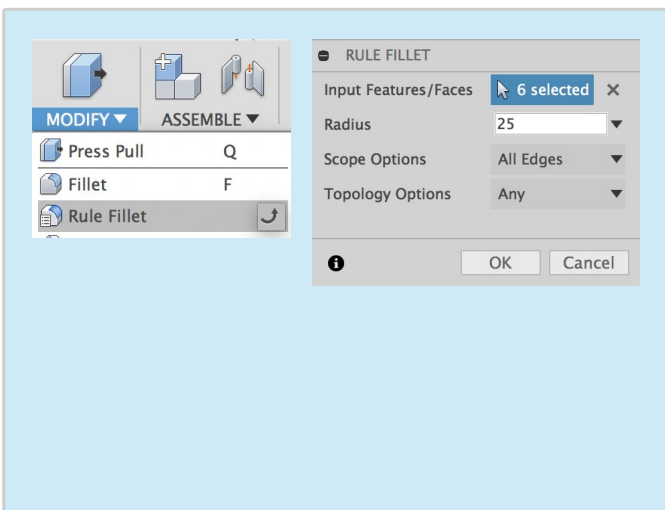
5 Create a Center Rectangle 3000 x 2500mm around the origin, Stop Sketch.



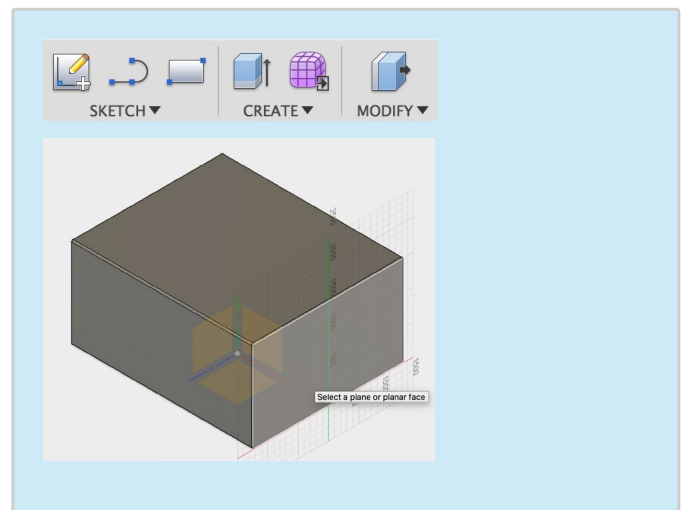
6 Create, Extrude the Rectangle upwards by 1500mm.



7 Modify, Rule Fillet, Select all 6 sides of the extrude rectangle by a radius of 25mm.

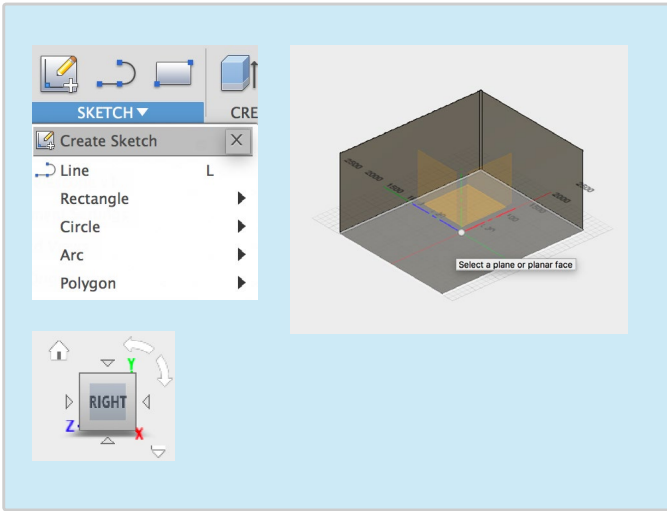


8 In the last 8 steps we've used Sketch, Create and Modify. Fusion 360 works from left to right starting with a sketch.

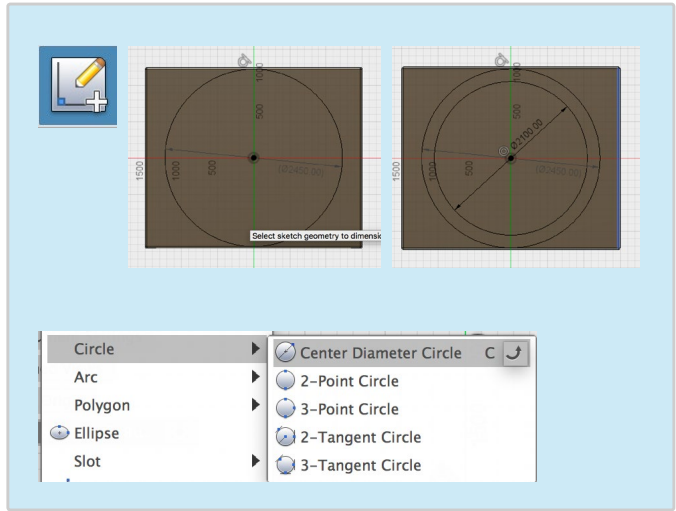


Step 1 Spacecraft Bus

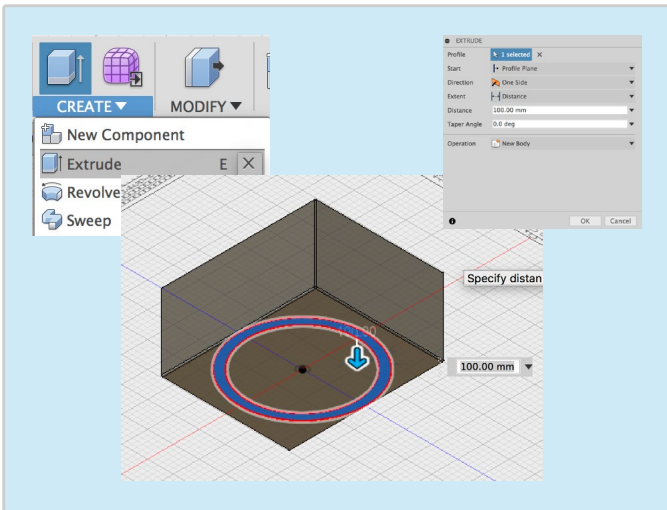
9 Navigate to the bottom of the spacecraft bus using the view cube. Create a new sketch on the bottom face of the spacecraft bus.



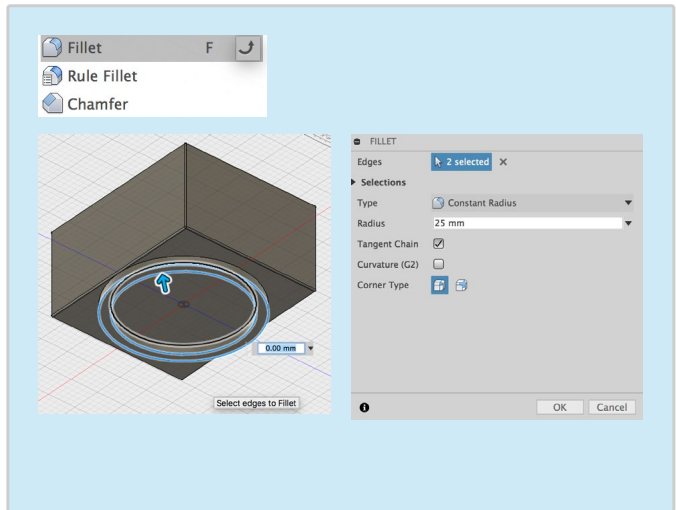
10 Use the center diameter circle tool to create two circles around the origin with a diameter of 2450 and 2100mm.



11 Create, Extrude the profile or ring created in the previous sketch, extrude downwards by a distance of 100mm. Set operation to new body.

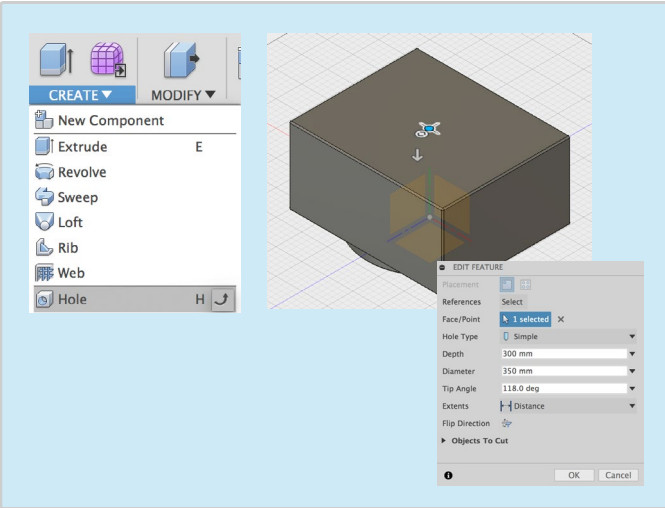


12 Modify, Fillet the outside edges of the newly extruded body. Fillet both edges by a radius of 25mm.

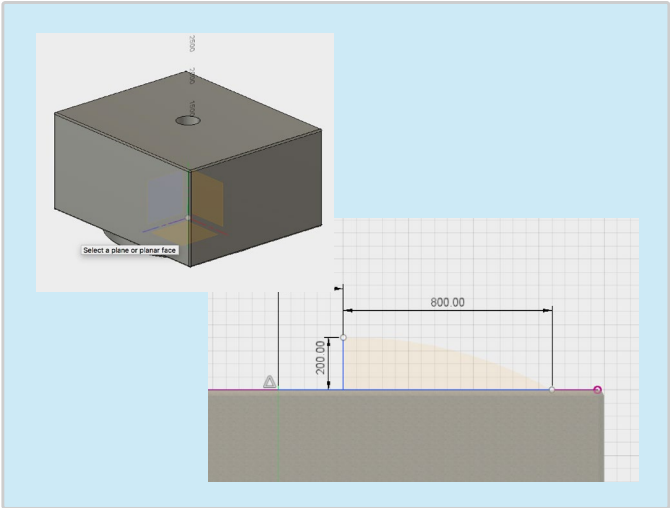


Step 1 Spacecraft Bus

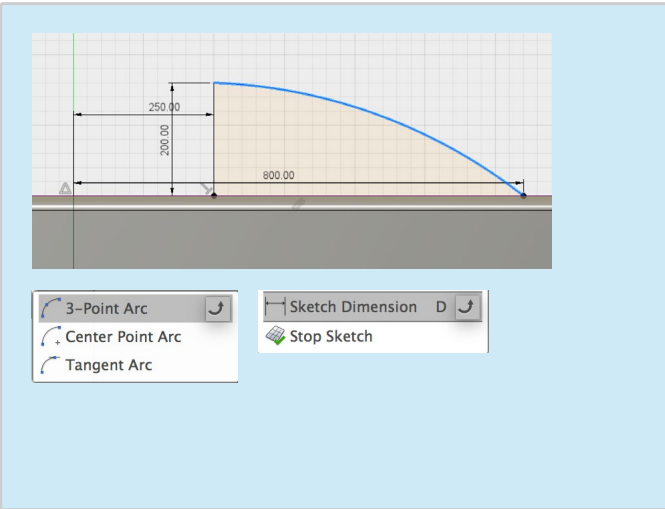
13 Create, Hole. Select the top face as the Face/Point. Drag the blue circle to the center of the body (it will snap to the center) Create a hole with a depth of 300mm and diameter 350mm.



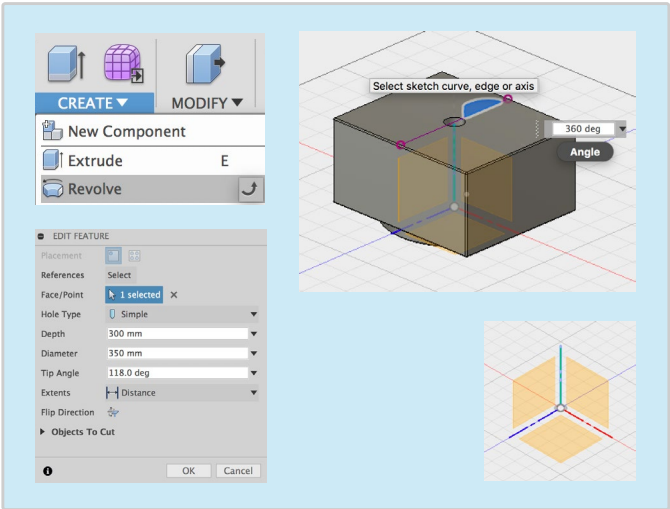
14 Create a new sketch on the plane shown above. Complete the following sketch on top of the body, sketch 250mm away from the origin. Then create a line going upwards by 200mm. Finally draw another line along the top of the spacecraft outwards by 800mm.



15 Then go back into the Sketch menu and go to Arc, then select the 3-Point arc tool. The first point is on the top of the vertical line. The second is at the end of the vertical 800mm line. The third point can be positioned near the first point.

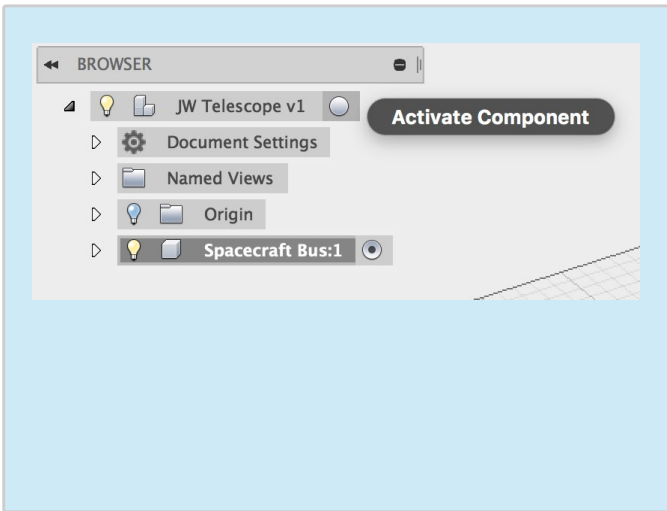


16 Create, Revolve. Select the previous sketch (this is the profile), click on axis and select the green axis pointing upwards (Tip: Try hiding Bodies in the Browser to help select the right axis). Make sure the operation is set to New Body.

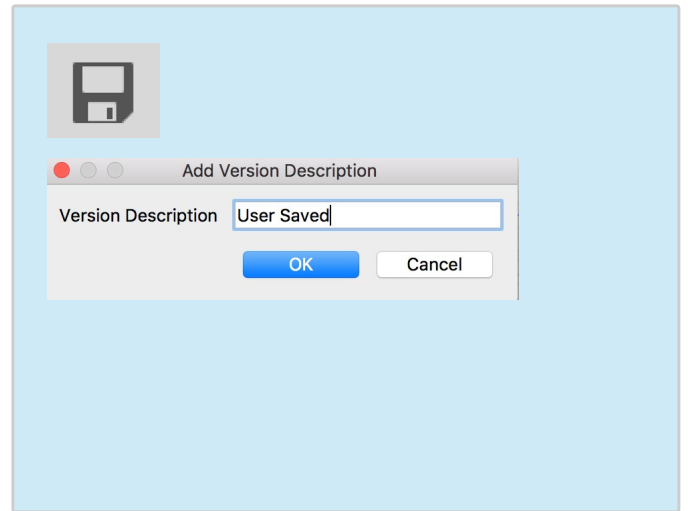


Step 1 Spacecraft Bus

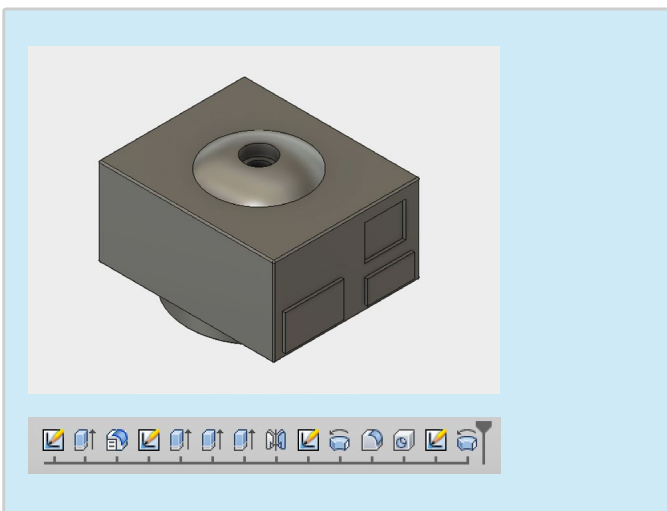
17 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



18 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Spacecraft Bus Complete.



Step 1 Completed – Move onto Step 2

Step 2 Deployment Tower

Lesson Objectives:

Recap Lesson Objectives in Step 1 (Sketch, Extrude)

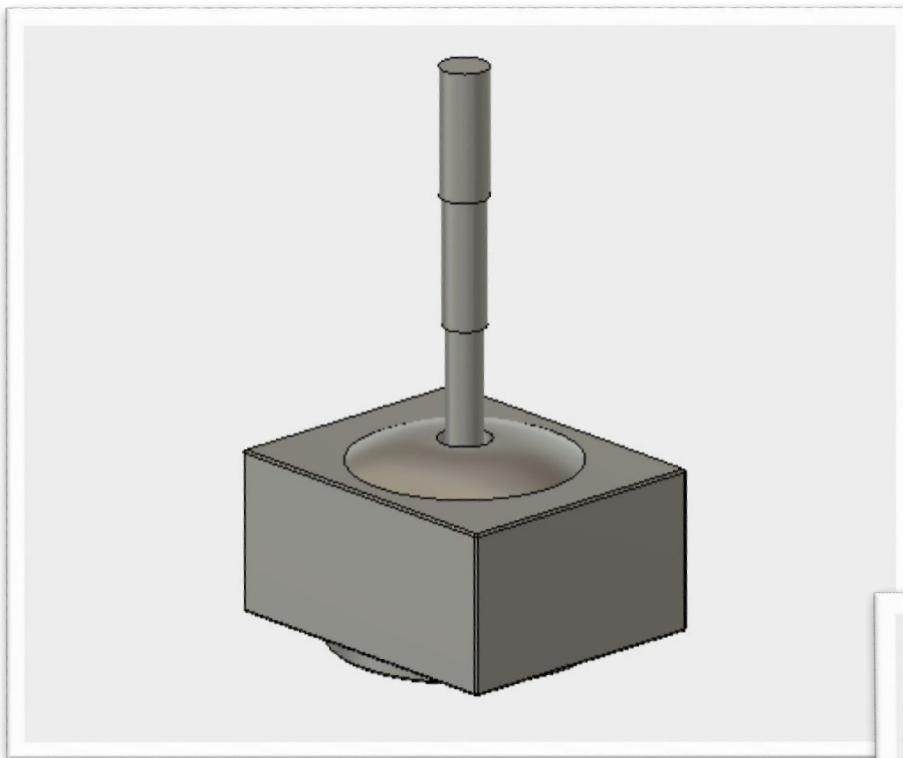
Direct Modelling Tools

Press Pull Tool

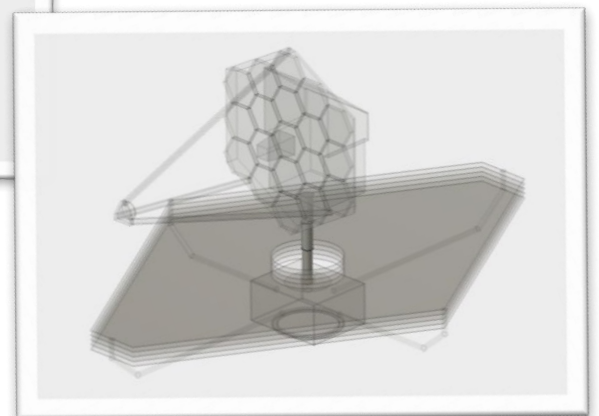
Create New Component

Deployment Tower

Supports the Science Instrument Module. Extends outwards once in space.

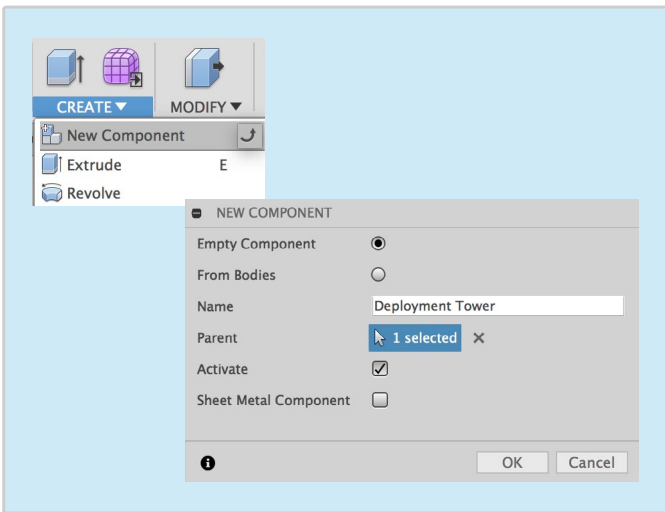


Sketches can be found in resources

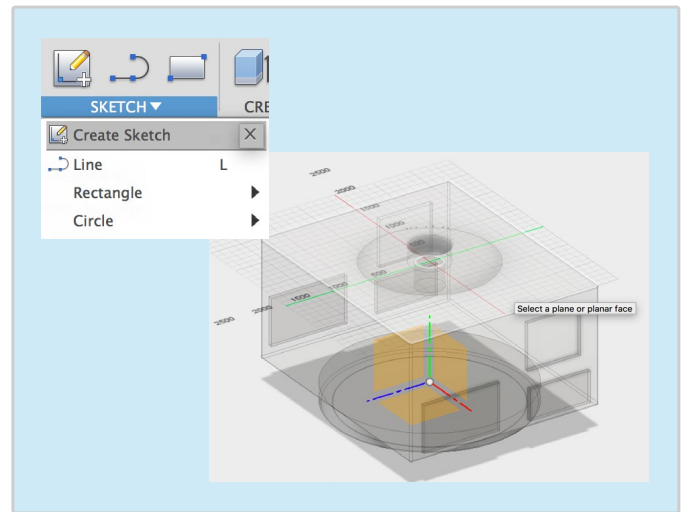


Step 2 Deployment Tower

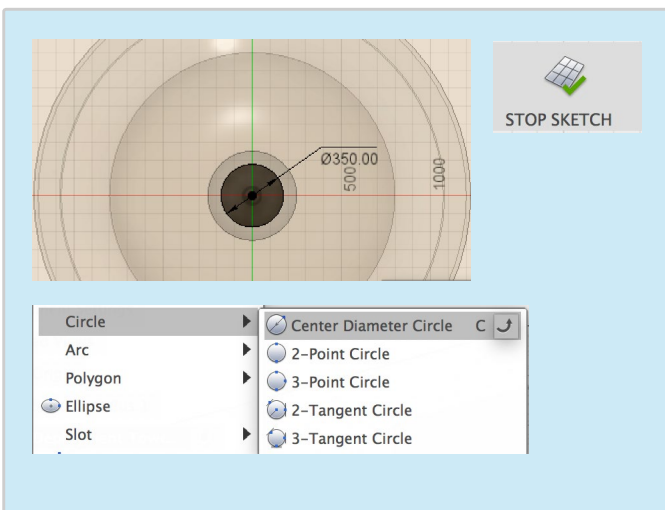
1 Create a new component named Deployment Tower.



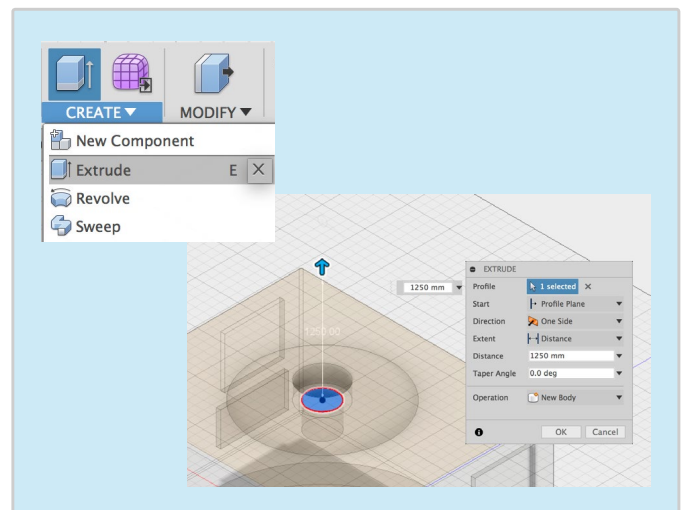
2 Create a new sketch on the top face of the body (notice its ghosted as we're working on a new component).



3 Create a Center Diameter Circle on the origin, 350mm in Diameter.

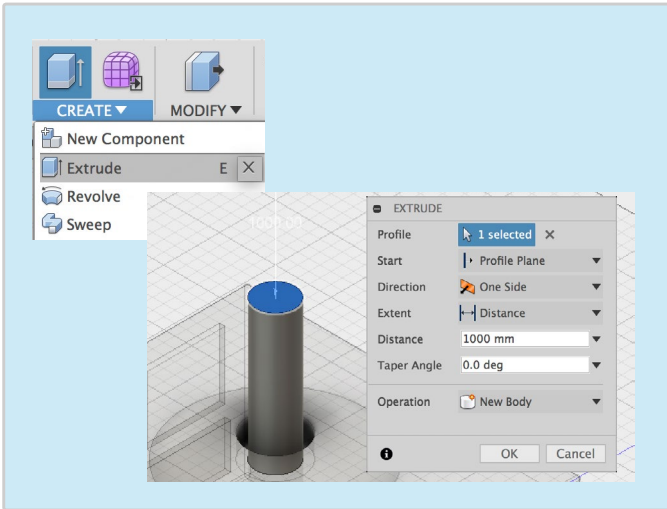


4 Create, Extrude the circle upwards by 1250mm.

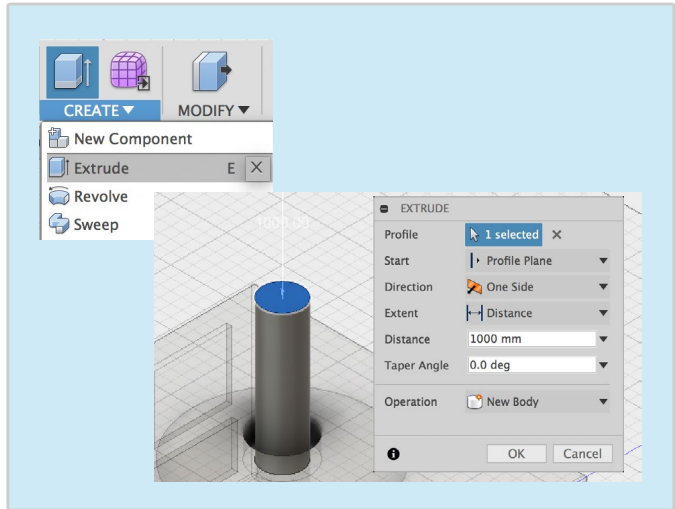


Step 2 Deployment Tower

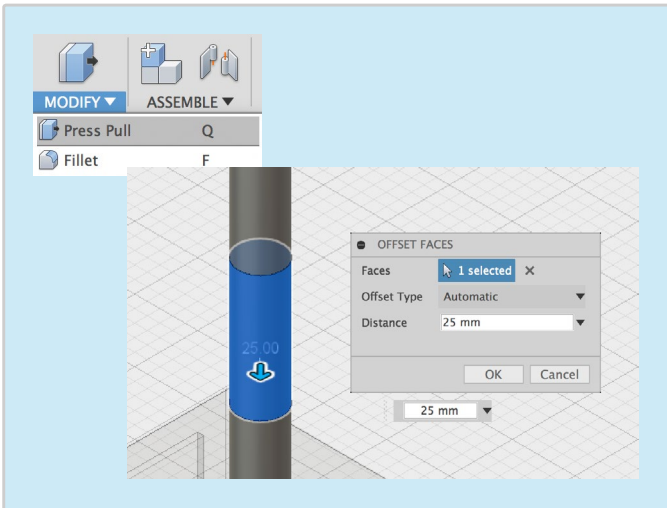
5 Create, Extrude the top of the cylinder by 1000mm upwards, change the operation to new body.



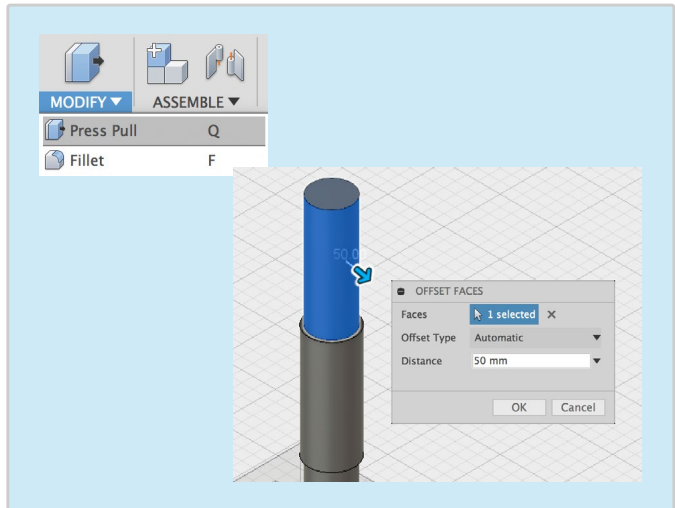
6 Repeat the same process. Extrude the top of the cylinder by 1000mm upwards, change the operation to new body.



7 Modify, Press Pull, Click on the middle cylinder and offset by a distance of 25mm.

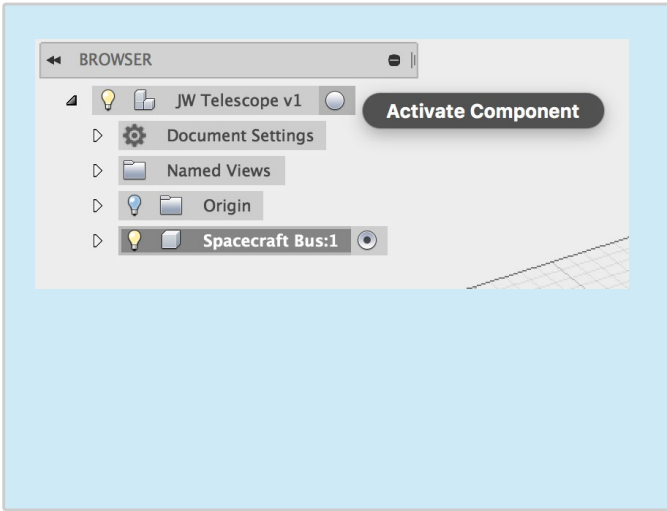


8 Repeat the process, Modify, Press Pull, Click on the top cylinder and offset by a distance of 50mm.

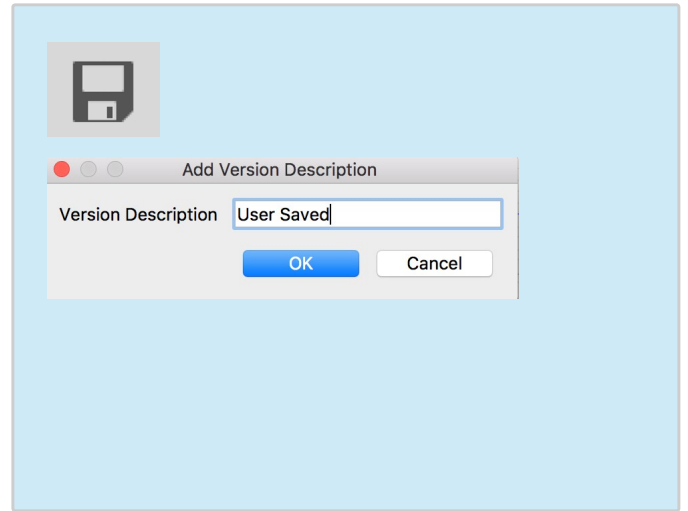


Step 2 Deployment Tower

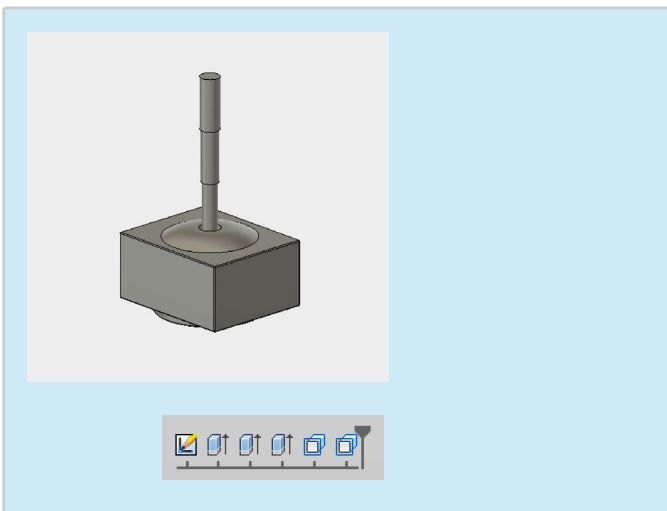
9 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



10 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Deployment Tower Complete.



Step 2 Completed – Move on to Step 3

Step 3 Science Instrument Module

Lesson Objectives:



Advanced Sketching



Construct an offset Plane



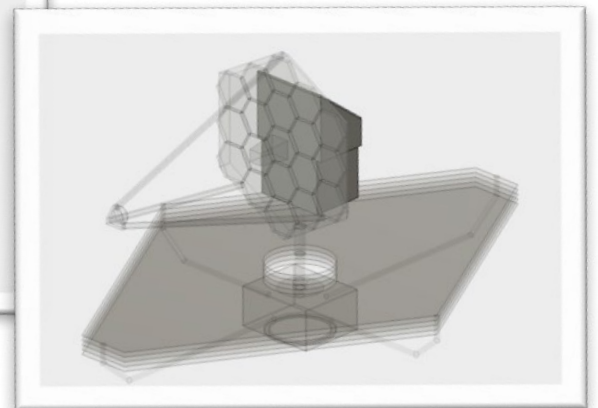
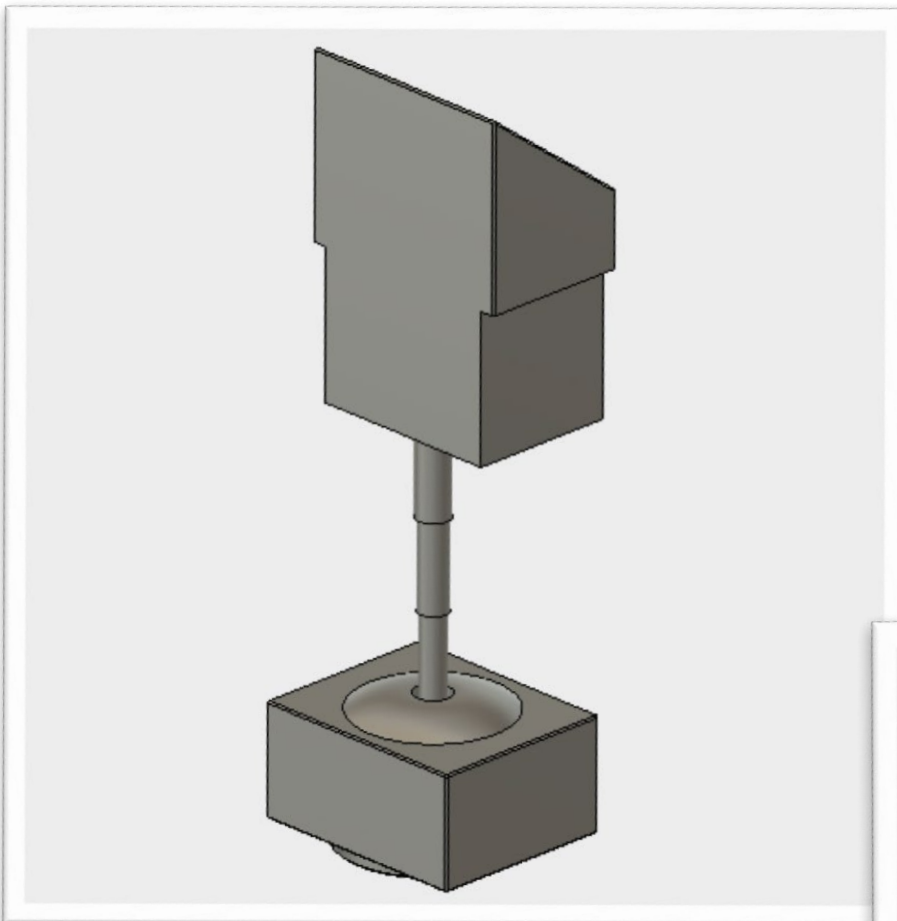
Change extrude operation to cut and new body



Mirror Features

Science Instrument Module

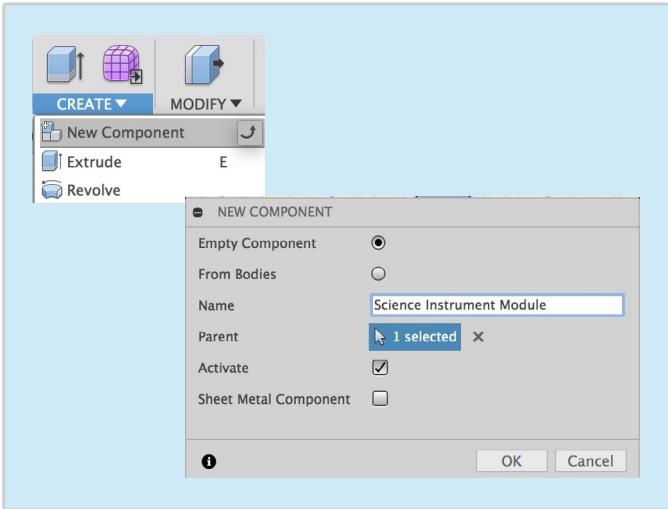
Houses all of Webb's cameras and science instruments



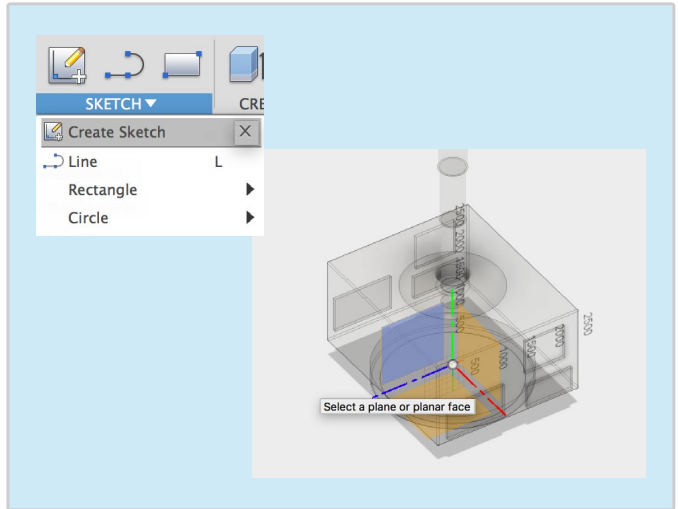
Sketches can be found in resources

Step 3 Science Instrument Module

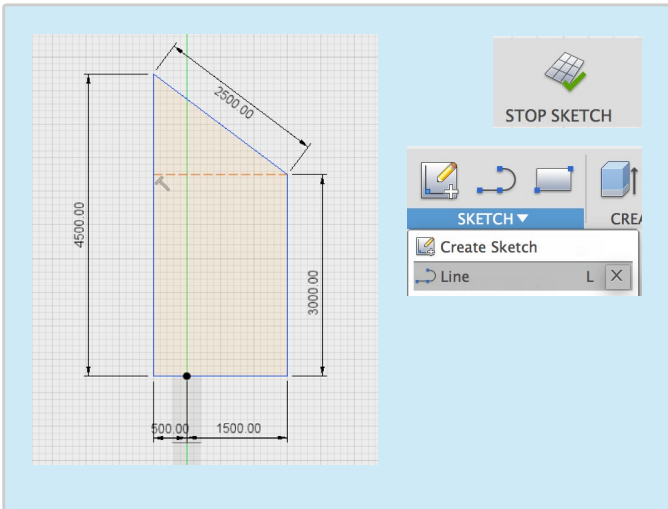
1 Create a new component named Science Instrument Module.



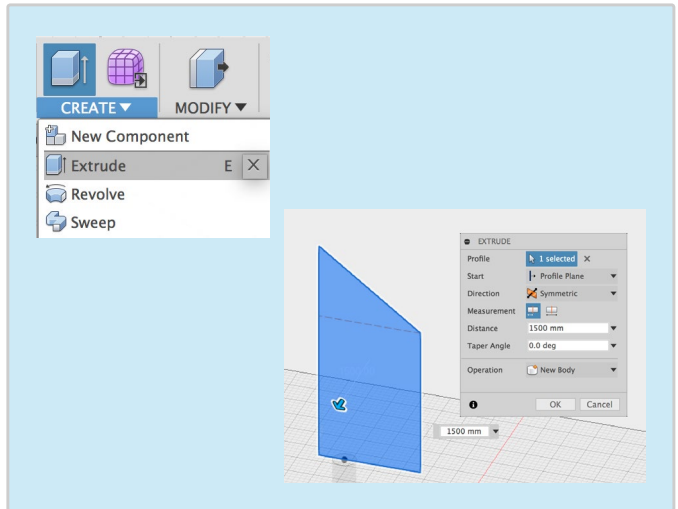
2 Create a new sketch on the plane shown above, the view cube should be on the Right view. Tip: Click on the right side of the view cube then select the plane.



3 Complete the following sketch using the line tool. Start from the top/center of the Deployment Tower.

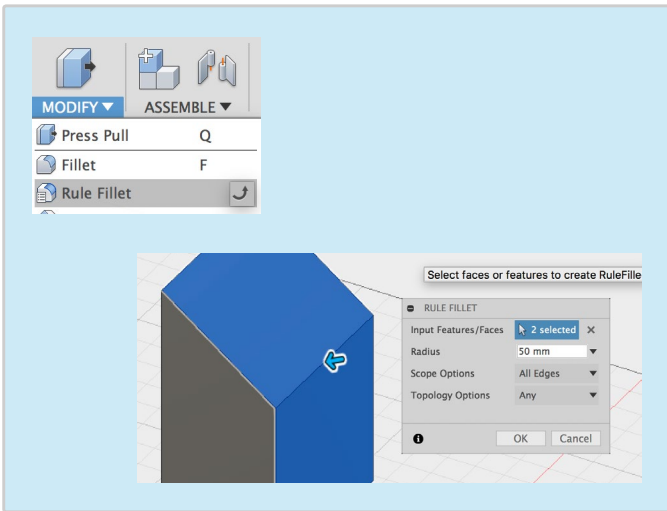


4 Create, Extrude the previous sketch outwards by 1500mm, change the direction to symmetric.

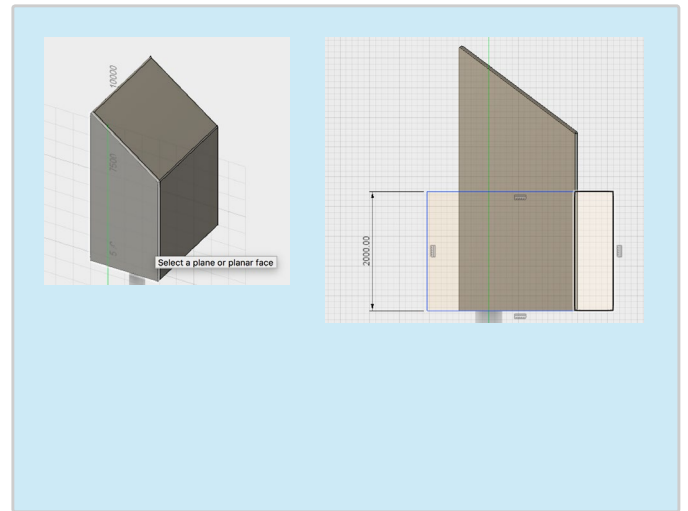


Step 3 Science Instrument Module

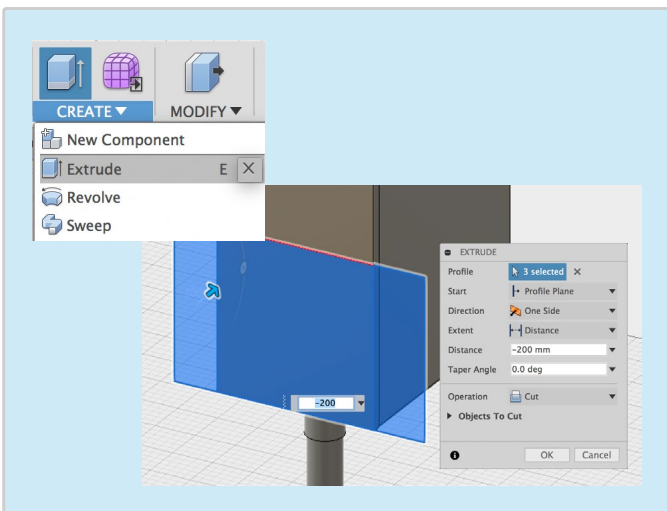
5 Modify, Rule Fillet. Select the two faces shown above. Fillet by a radius of 50mm.



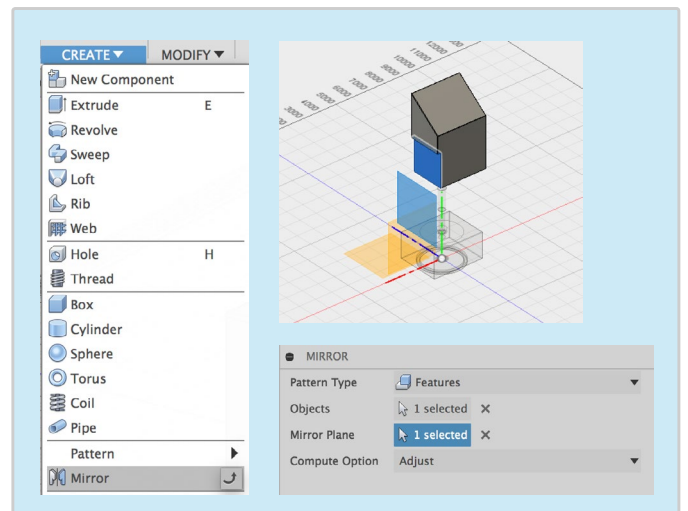
6 Create a sketch on the side of the module (Shown above). Create a 2 point rectangle 2000mm high making sure the rectangle is wider than the module. Stop Sketch.



7 Create, Extrude the rectangle inwards by 200mm making sure it cuts into the body.

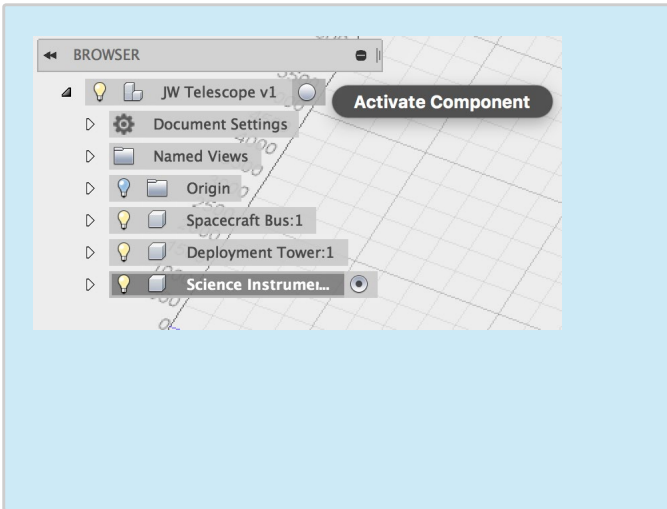


8 Create, Mirror the previous extrusion onto the other side of the module. Change pattern type to features and select the last extrusion in the timeline. Then select the mirror plane going down the center of the module.

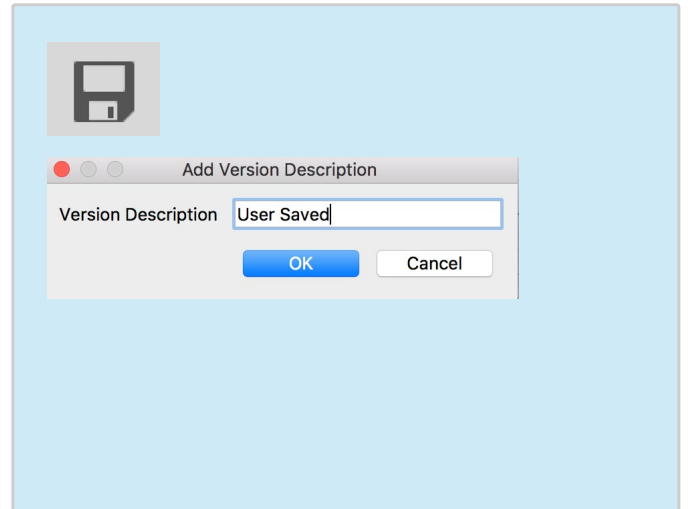


Step 3 Science Instrument Module

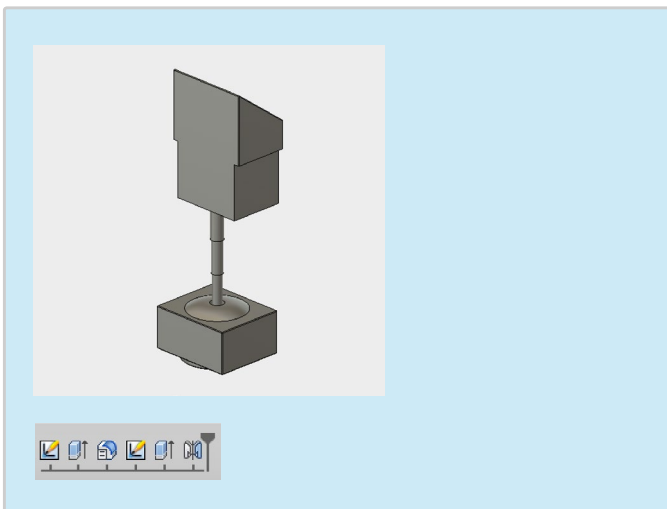
9 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



10 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Science Instrument Module Complete.



Step 3 Completed – Move on to Step 4

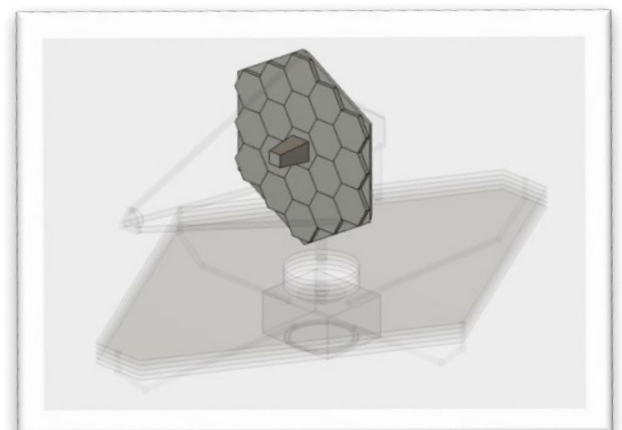
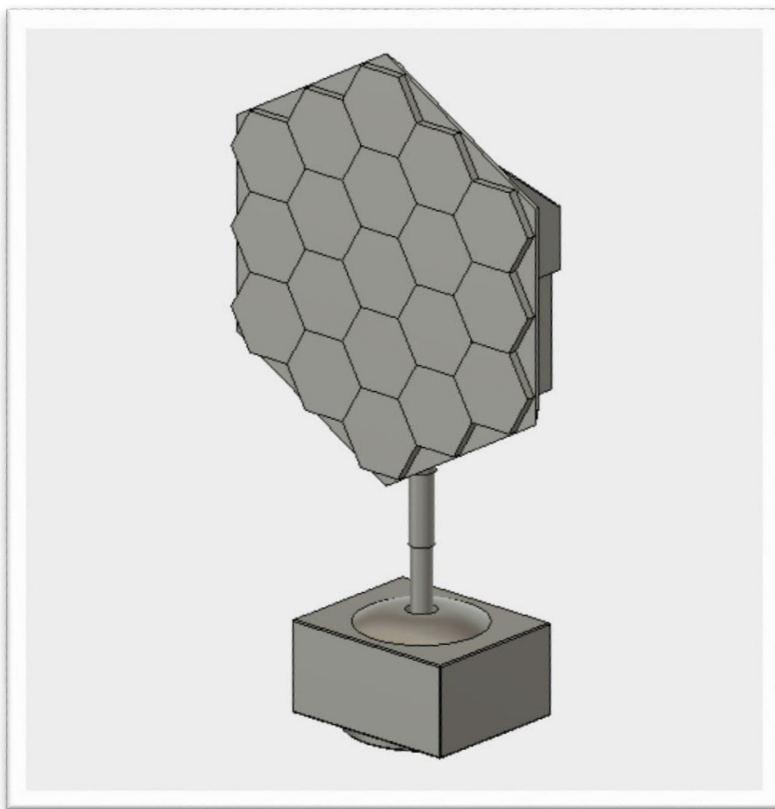
Step 4 Backplane & Primary Mirror

Lesson Objectives:



Primary Mirror

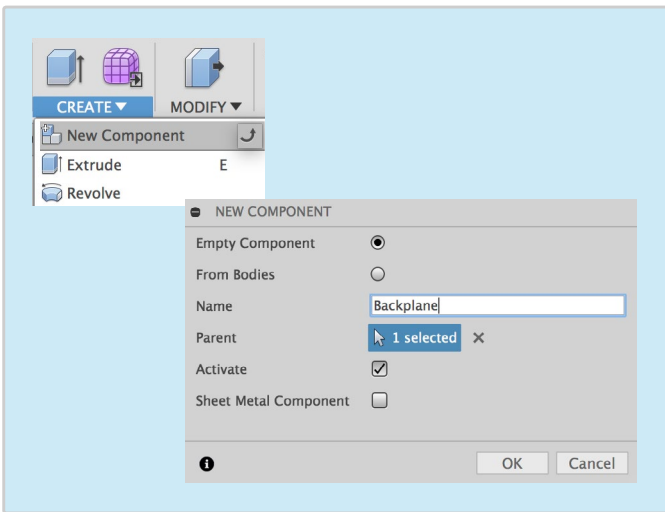
18 Hexagonal segments made of the metal beryllium and coated with gold to capture faint infrared light.



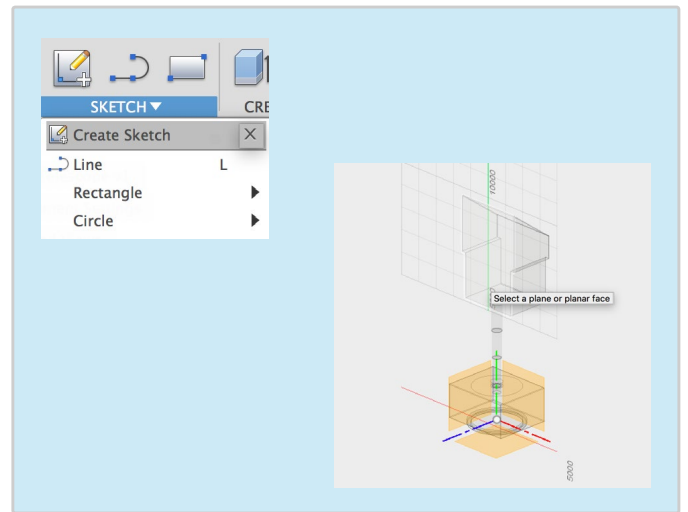
Sketches can be found in resources

Step 4 Backplane & Primary Mirror

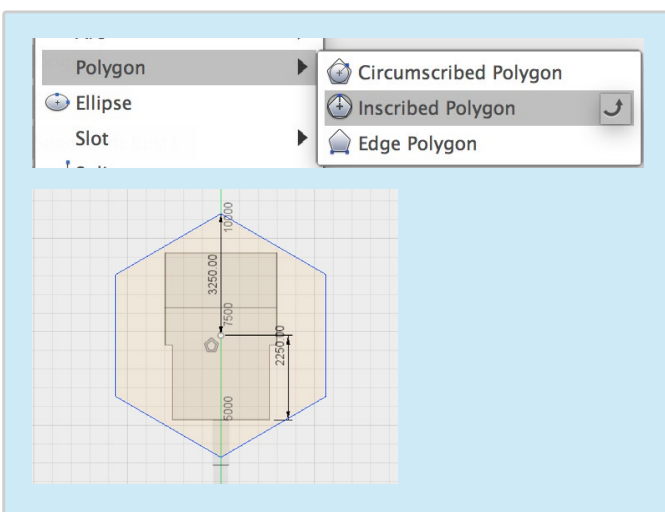
1 Create a new component named Backplane.



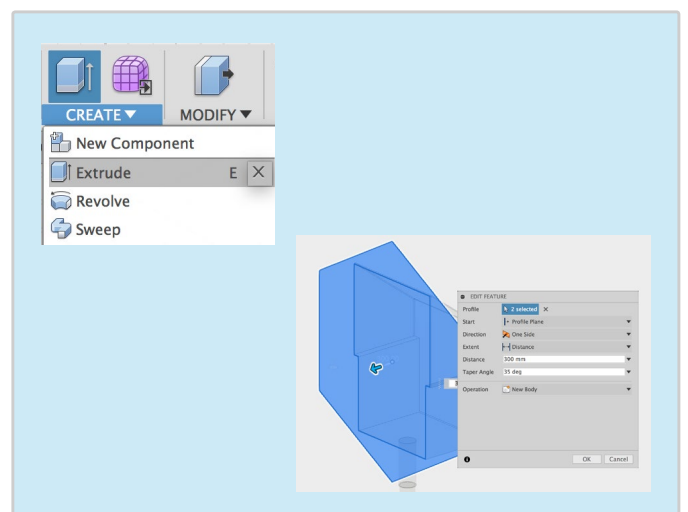
2 Create a new sketch on the front of the module, the view cube should be on the Front view.



3 Create a 6 sided Circumscribed Polygon with a radius of 3250mm on the green axis, dimension the hexagon 2250mm away from the bottom of the module.

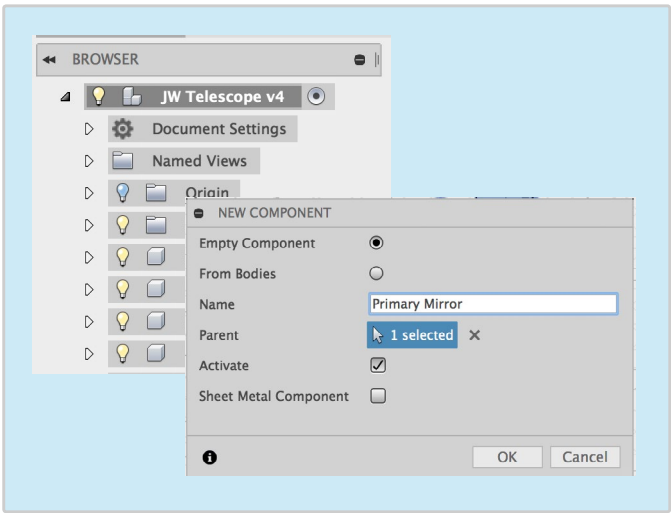


4 Create, Extrude the hexagon outwards by 300mm with a taper angle of 35 degrees.

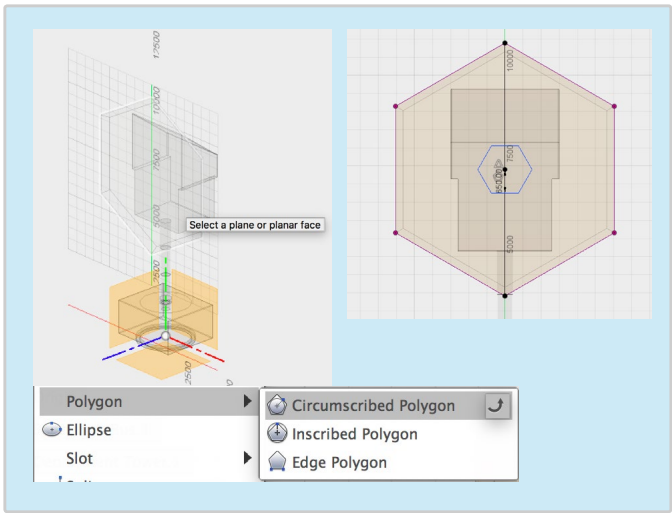


Step 4 Backplane & Primary Mirror

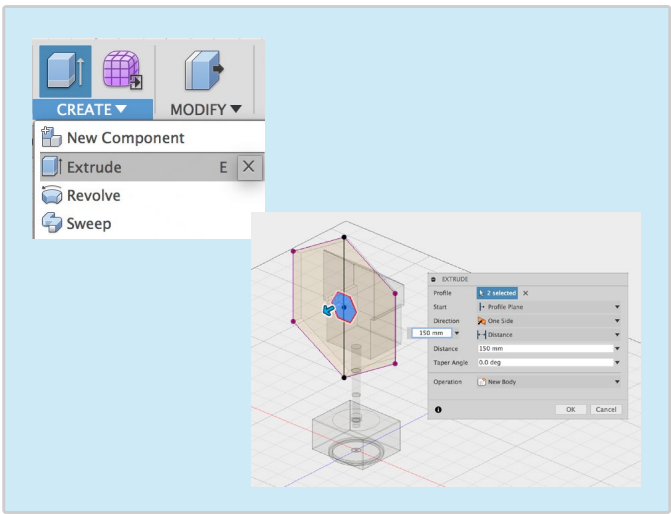
5 Activate the top component using by clicking on the white circle. Create a new component named Primary Mirror.



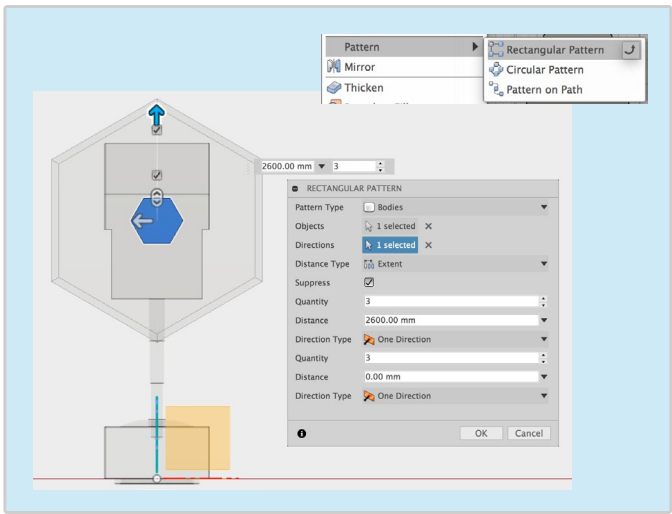
6 Create a sketch on the front of the Backplane as shown. Create a Circumscribed Polygon with 6 side and a diameter of 650mm in the middle of the Backplane.



7 Create, Extrude the hexagon outwards by 150mm making sure the operation is on new body.

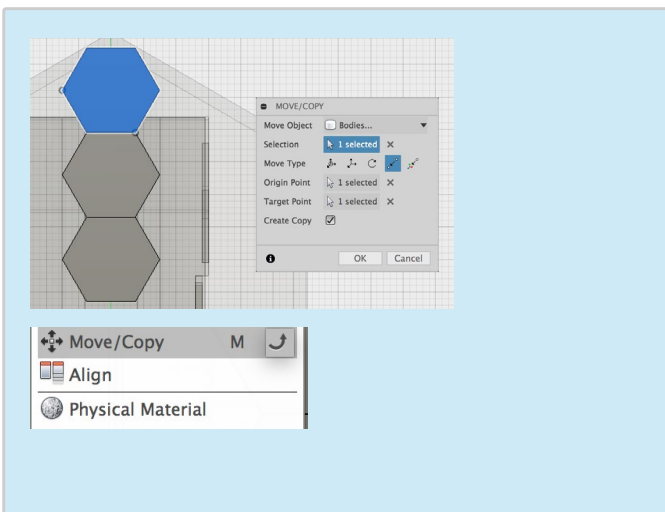


8 Create, Pattern, Rectangular Pattern. Change pattern type to bodies, Select the hexagonal body. Click direction and select the green axis. Pull the arrow upwards. Distance 2600mm and quantity 3.

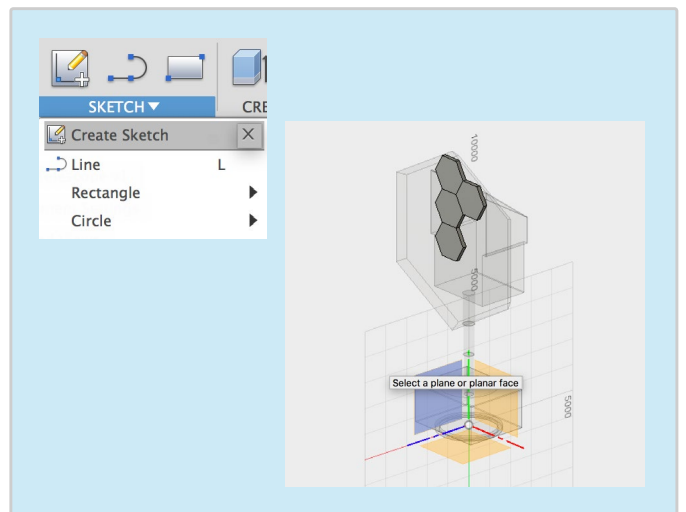


Step 4 Backplane & Primary Mirror

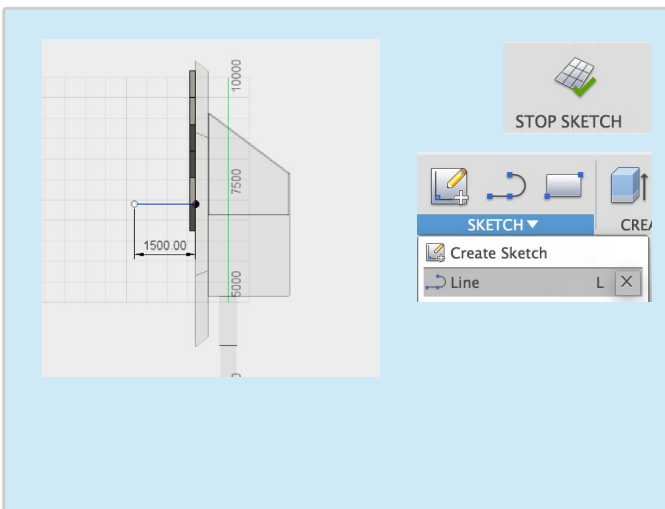
9 Modify, Move/Copy. Change move object to Bodies. Select the middle hexagon as the Selection. Change move type to point to point. Make sure Create copy is selected. Copy a new hexagon into position as shown.



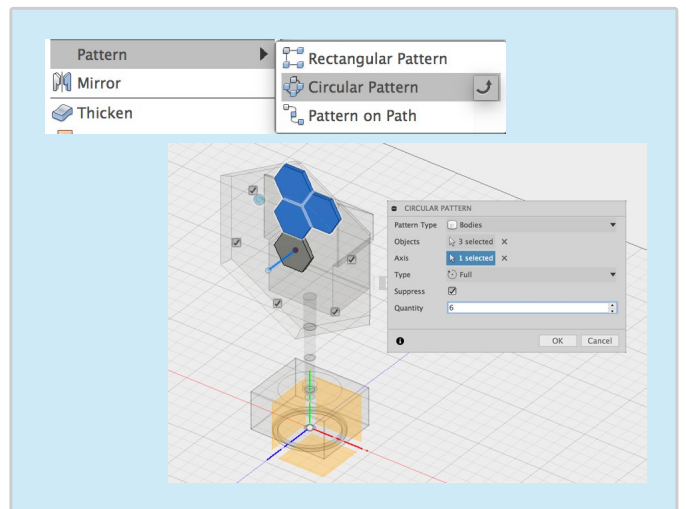
10 Create a sketch on the plane shown, Complete the sketch shown.



11 Using the line tool draw a line going outwards from the center of the Backplane/Primary Mirror.

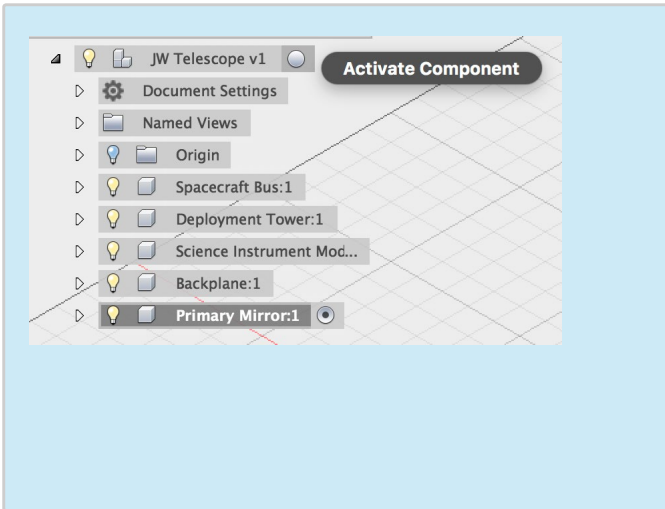


12 Create, Pattern, Circular Pattern. Change the Pattern Type to Bodies. Select the bodies shown above. Click on axis and select the line created on the previous sketch. Change the quantity from 3 to 6.

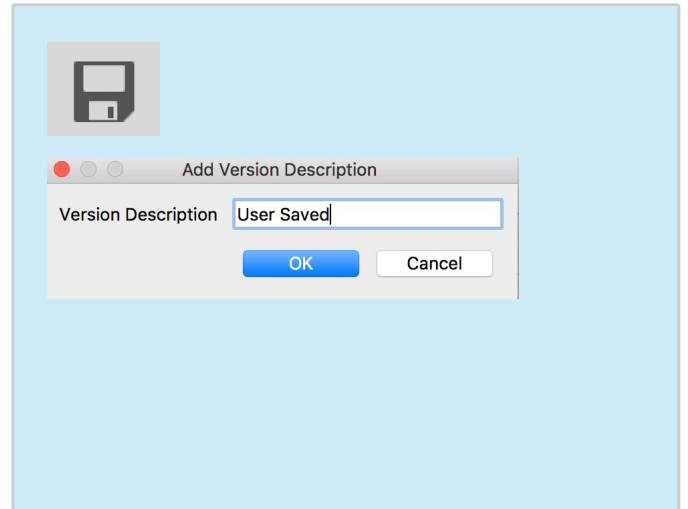


Step 4 Backplane & Primary Mirror

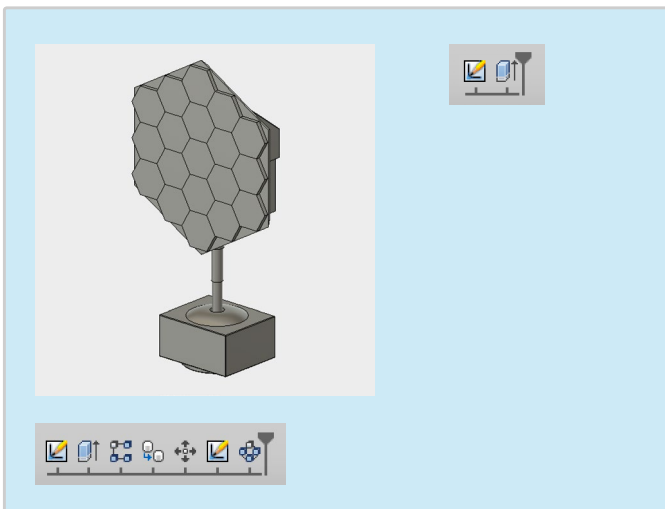
13 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



14 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Backplane & Primary Mirror Complete.



Step 4 Completed – Move on to Step 5

Step 5 Aft-Optics Subsystem & Secondary Mirror

Lesson Objectives:



Construct an Offset Plane



Loft between Profiles



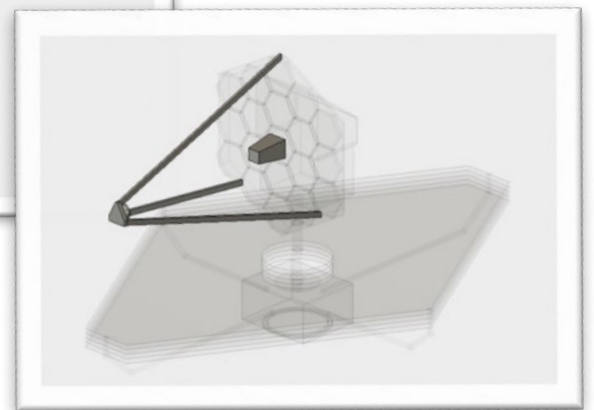
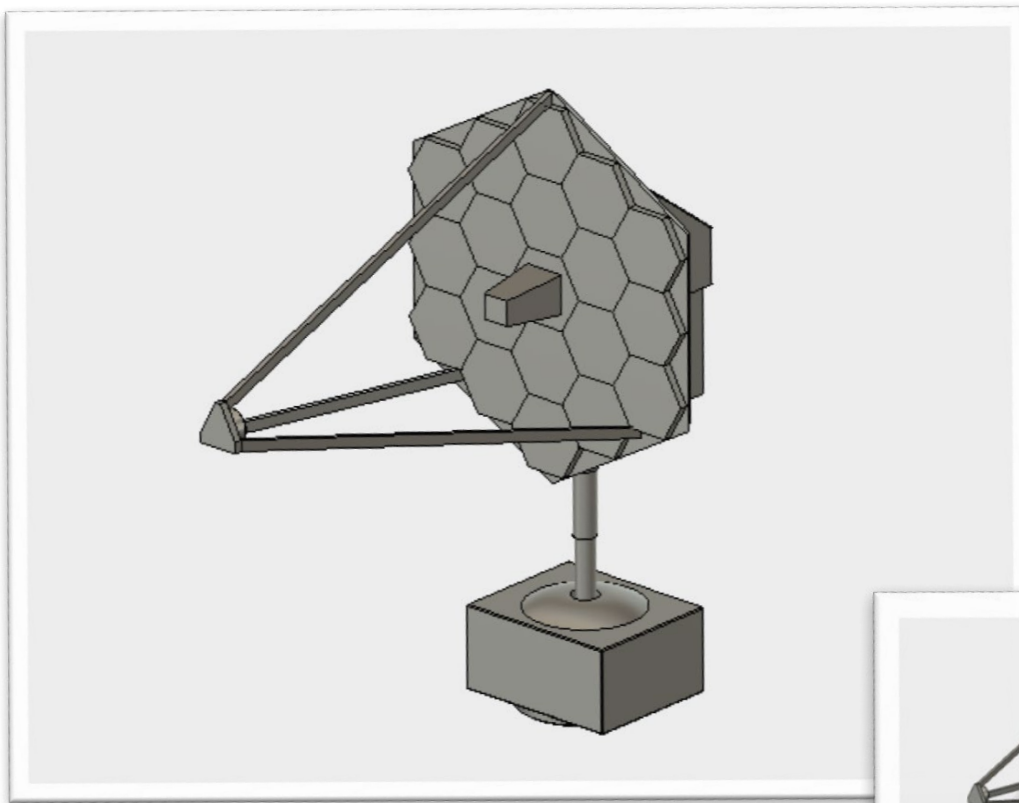
Advanced Sketching



Mirror Bodies

Secondary Mirror

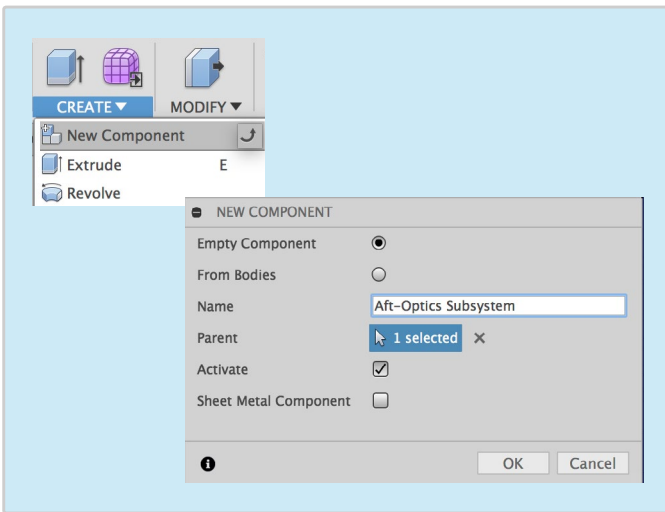
Reflects gathered light from the primary mirror into the science instruments



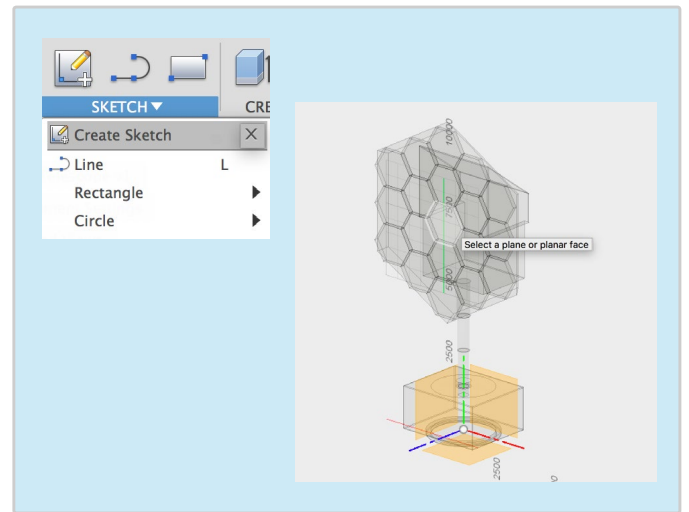
Sketches can be found in resources

Step 5 Aft-Optics Subsystem & Secondary Mirror

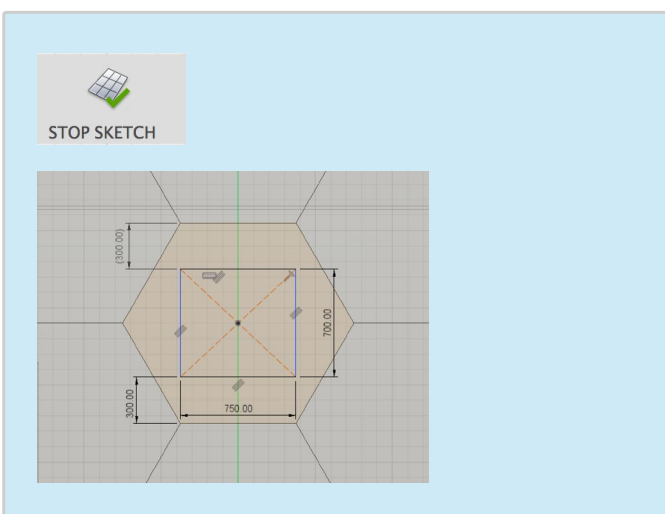
1 Create a new component named Aft- Optics Subsystem.



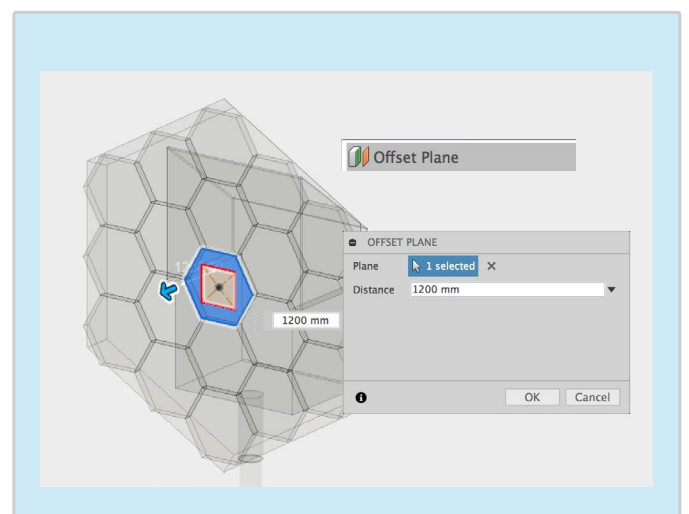
2 Create a new sketch on the front of the primary mirror, the view cube should be on the Front view.



3 Complete the following sketch using the center rectangle, draw a rectangle 750mm wide by 700 mm high from the center of the primary mirror.

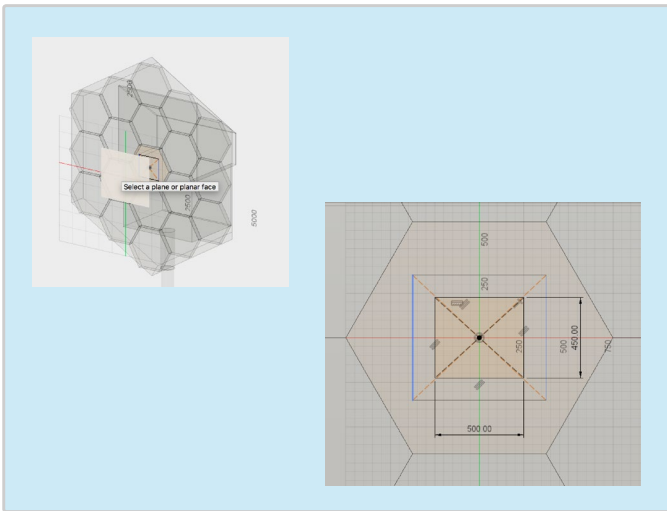


4 Construct, Offset Plane. Offset a plane 1200mm away from the Primary Mirror.

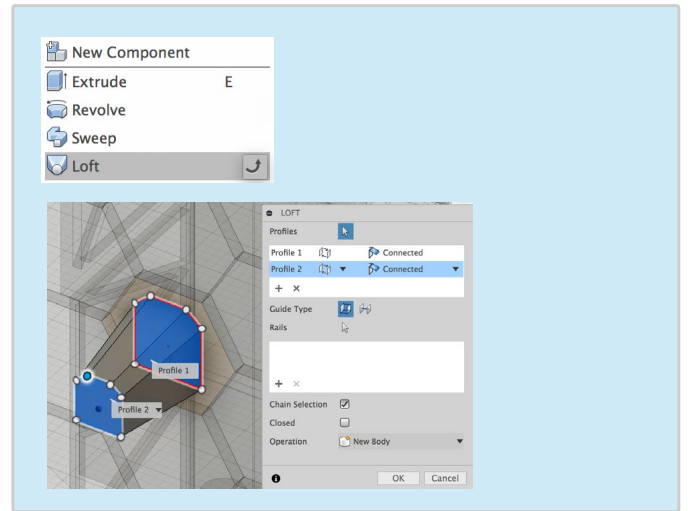


Step 5 Aft-Optics Subsystem & Secondary Mirror

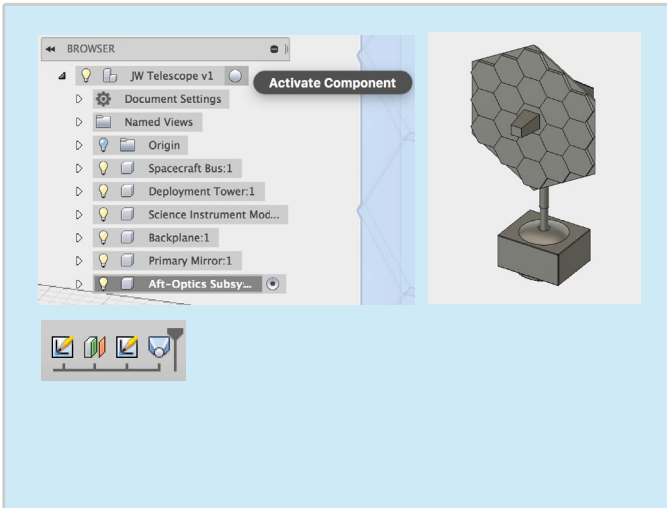
5 Create a new sketch on the newly offset construction plane. Create a center rectangle 500mm wide by 450mm high from the centre.



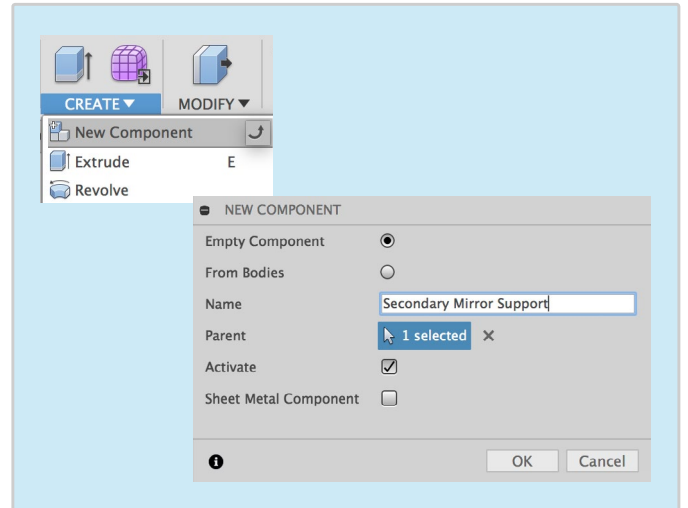
6 Create, Loft. Select Profile 1 (the first sketch) and Profile 2 (the second sketch) creating a new body.



7 Aft- Optics Subsystem Completed – Activate the top component by click the white circle.

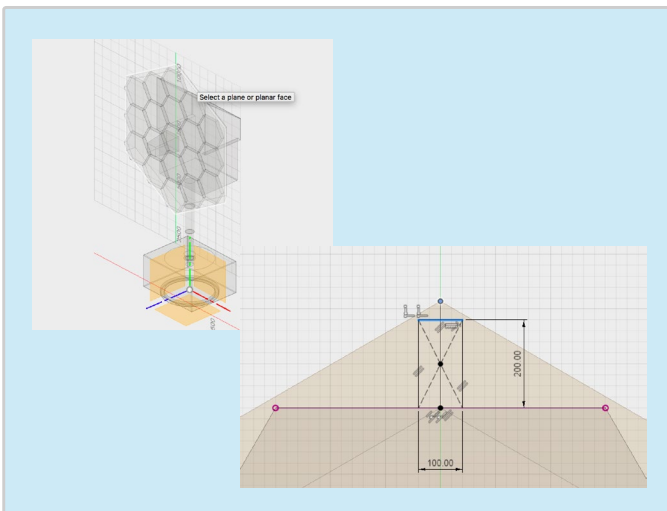


8 Create a new component named Secondary Mirror Supports.

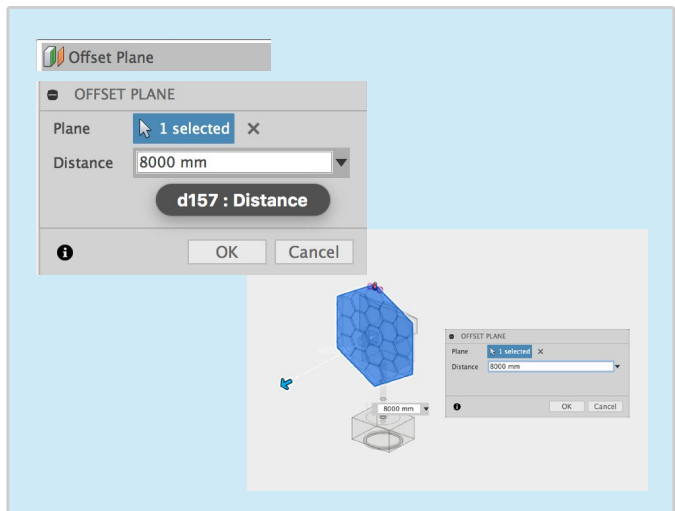


Step 5 Aft-Optics Subsystem & Secondary Mirror

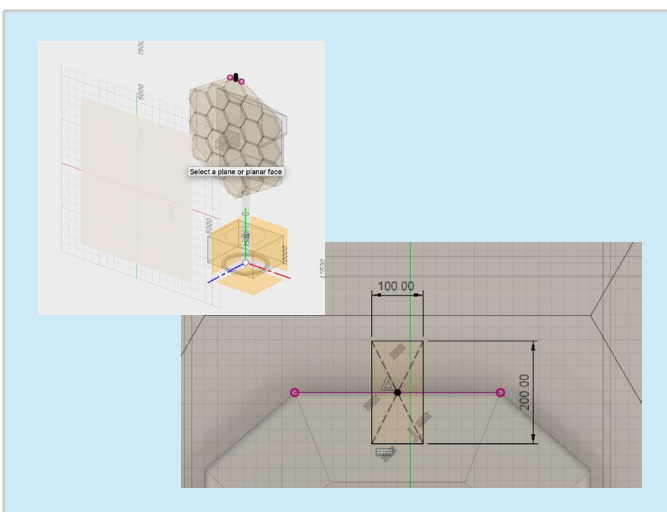
9 Create a new sketch on the front of the Backplane (as shown). Create a centre rectangle 200mm high by 100mm wide on the green axis. The bottom line should be in line with the top of the primary mirror.



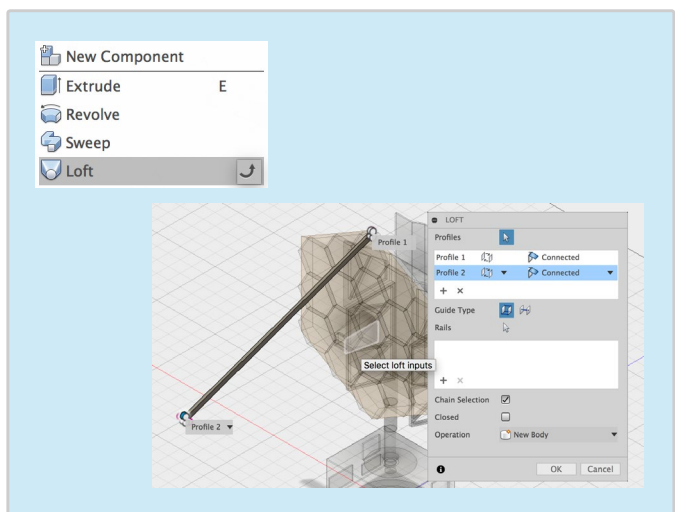
10 Construct, offset plane. Offset a plane 8000mm away from the Backplane.



11 Create a new sketch on the offset plane shown above. Create a center rectangle 200mm high by 100mm wide positioned in the middle of the top line of the Aft-Optics Subsystem.

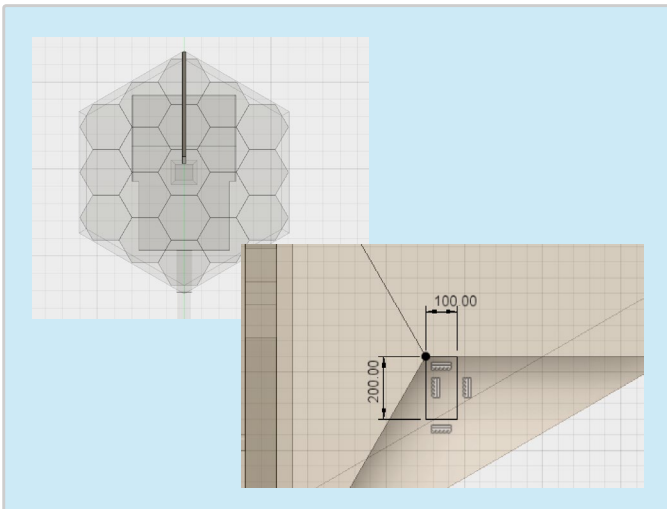


12 Create, Loft. Loft between profile 1 (the first rectangle) and profile 2 (the second rectangle) creating a new body.

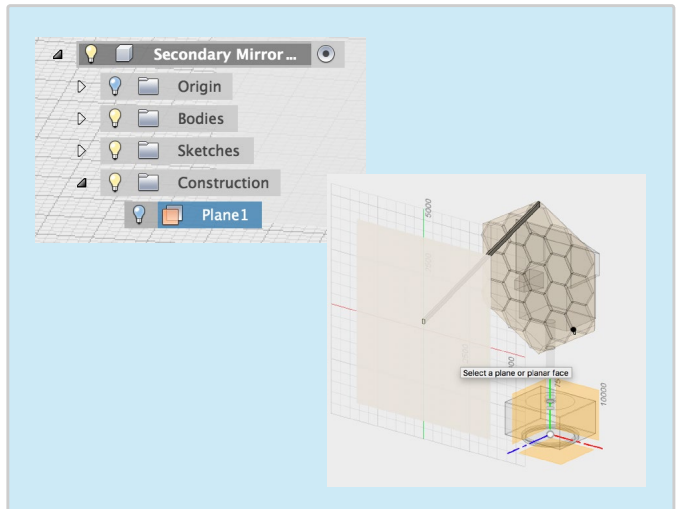


Step 5 Aft-Optics Subsystem & Secondary Mirror

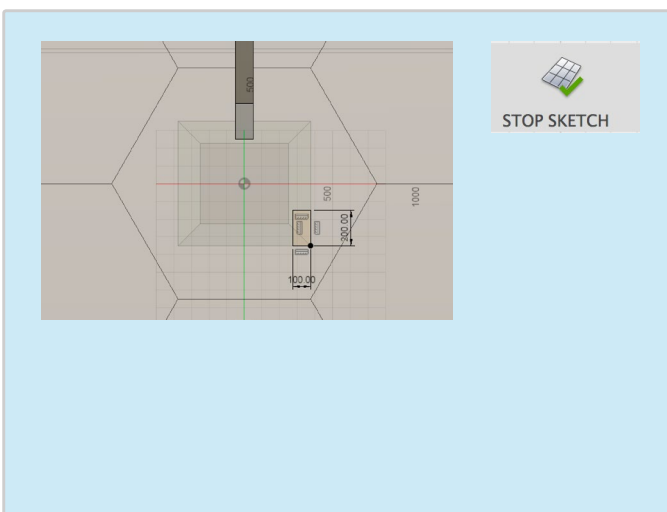
13 Create a new sketch on the backplane. In the area shown above create a 2 point rectangle 200mm high and 100mm wide. The first point should be on the corner of the hexagon as shown.



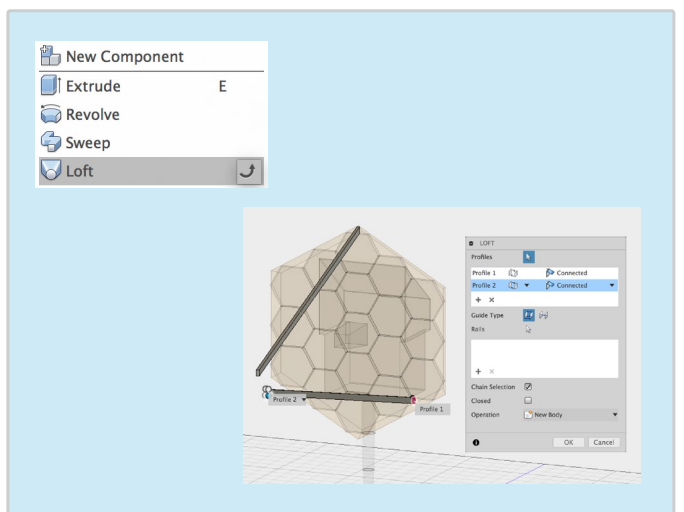
14 In the browser open the secondary mirror support component. Go into Construction and show plane 1 using the lightbulb. Create a new sketch on this plane.



15 Complete the Sketch by creating a 2 point rectangle from the bottom corner of the Aft-Optics Subsystem, 200mm high by 100mm wide. Make sure the first point is on the corner. Stop sketch when completed.

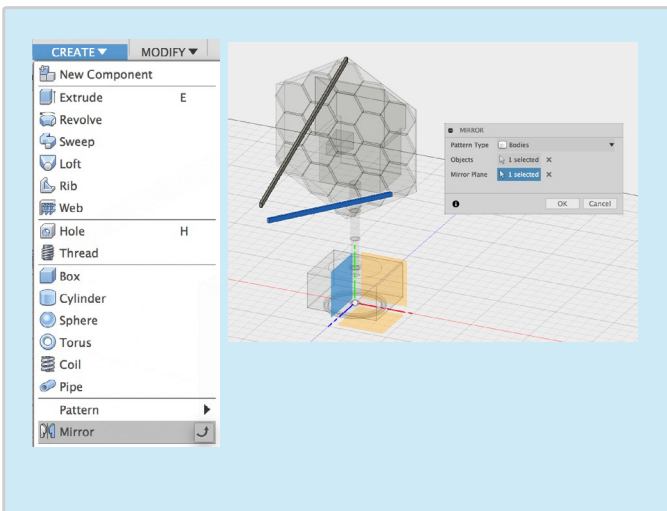


16 Create, Loft. Loft between profile 1 (the first rectangle) and profile 2 (the second rectangle on the offset plane) creating a new body.

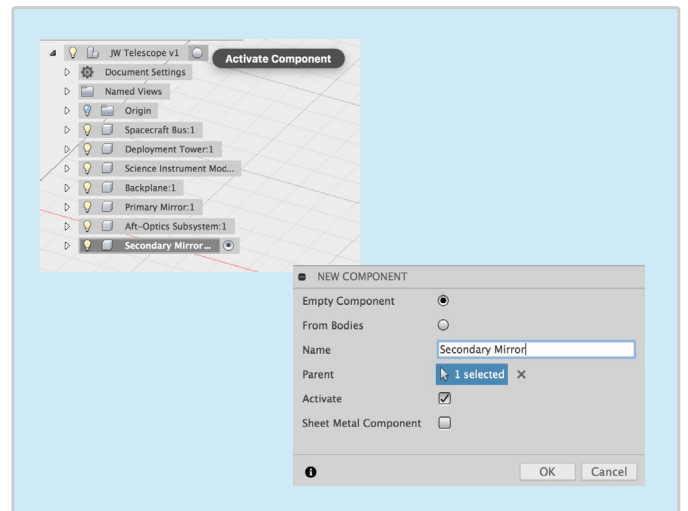


Step 5 Aft-Optics Subsystem & Secondary Mirror

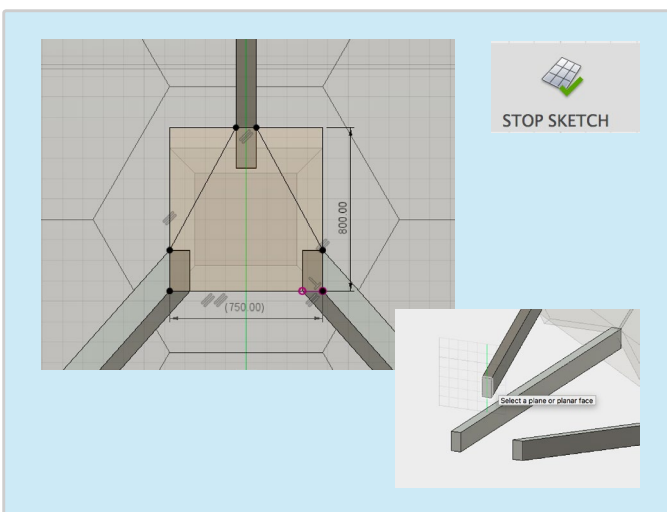
17 Create, Mirror. Change the pattern type to bodies. Then select the support as shown above. Select the mirror plane going down the middle of the model to mirror the body.



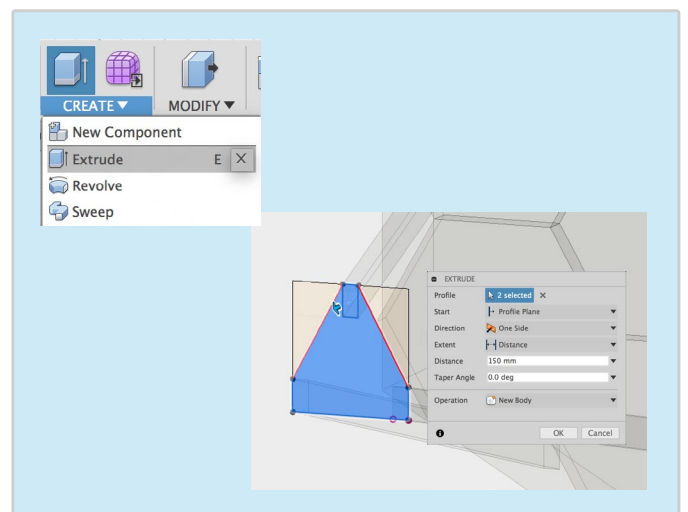
18 Activate the top component by clicking on the white circle. Then create a new component named Secondary Mirror.



19 Create a new sketch on the ends of the supports (as shown). Complete the following sketch using a 3 point rectangle 750 x 800mm. Then draw a line from, the corners of the supports. Once complete click stop sketch.

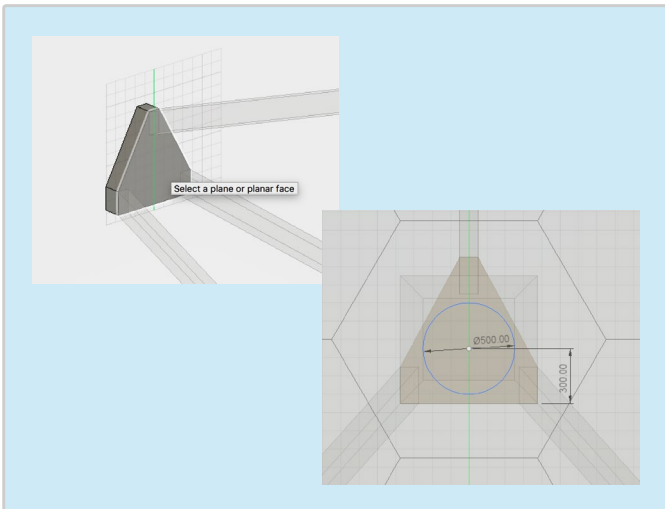


20 Create, Extrude. Using the previous sketch, extrude the profile outwards by 150mm creating a new body.

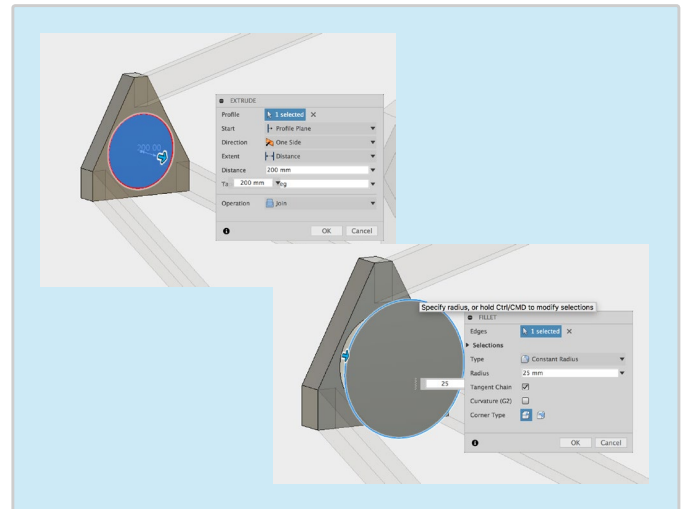


Step 5 Aft-Optics Subsystem & Secondary Mirror

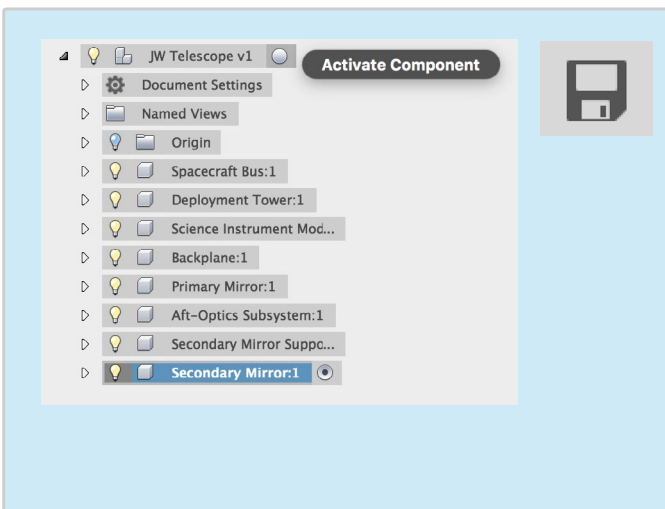
21 Create a new sketch on the inside of the Secondary Mirror. Using a center, draw a circle 500mm in diameter. Click Stop Sketch once completed.



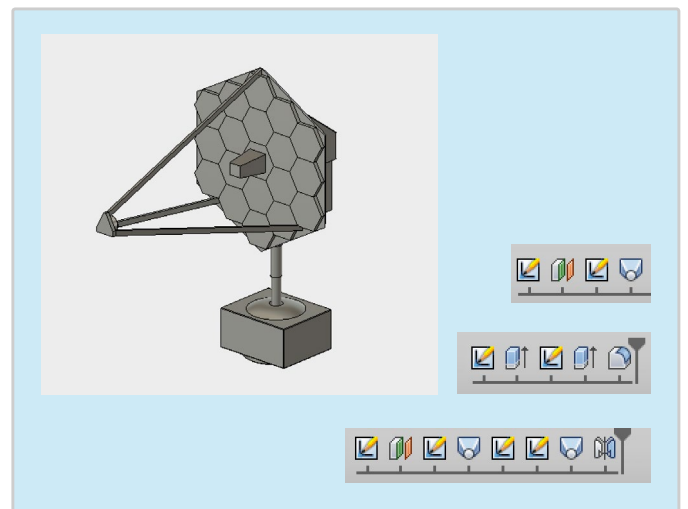
22 Create, Extrude the circle outwards by 200mm with a taper angle of 25 degrees, change the operation to new body. Then modify, fillet the edge shown above by a radius of 25mm.



23 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle. Make sure to save your work after every step.



Aft-Optics Subsystem, Secondary Mirror & Supports Complete.



Step 5 Completed – Move on to Step 6

Step 6 Multilayer Sunshield

Lesson Objectives:



Navigate the Sculpt Workspace



Create Form



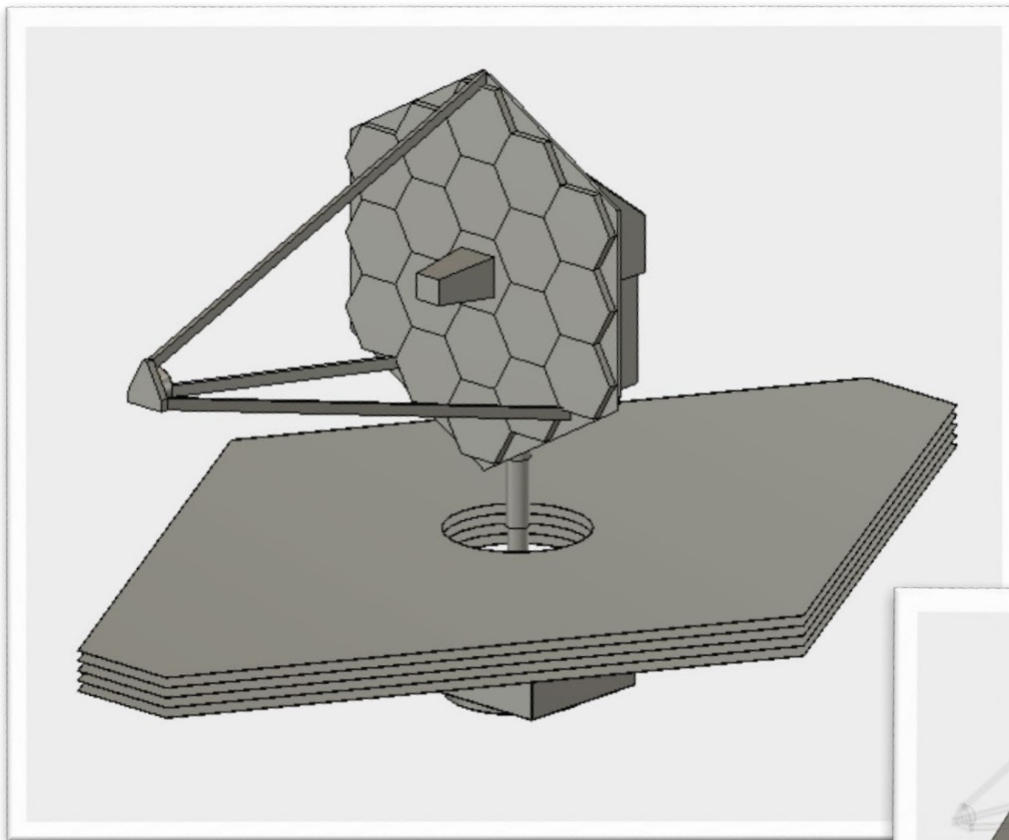
Create a T Spline body using the face tool



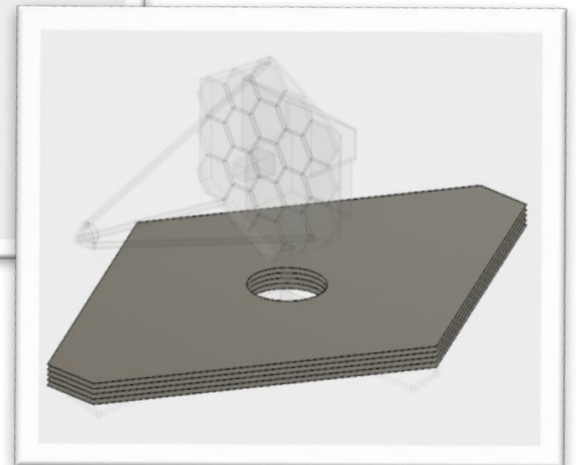
Edit Form

Multilayer Sunshield

Five Layers shield the observatory from the light and heat of the Sun and Earth

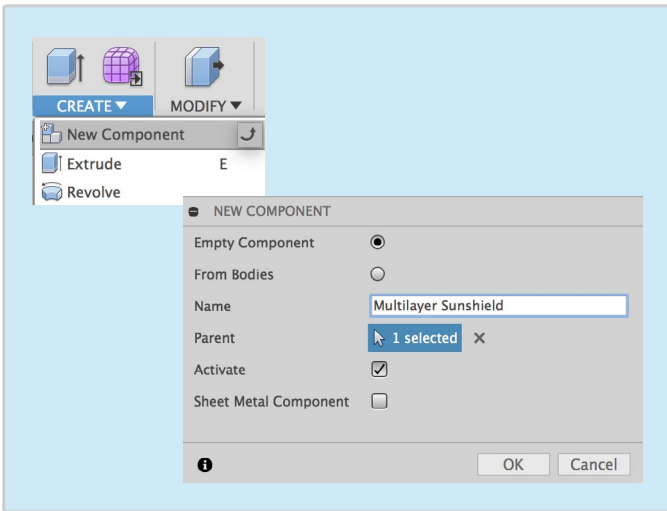


Sketches can be found in resources

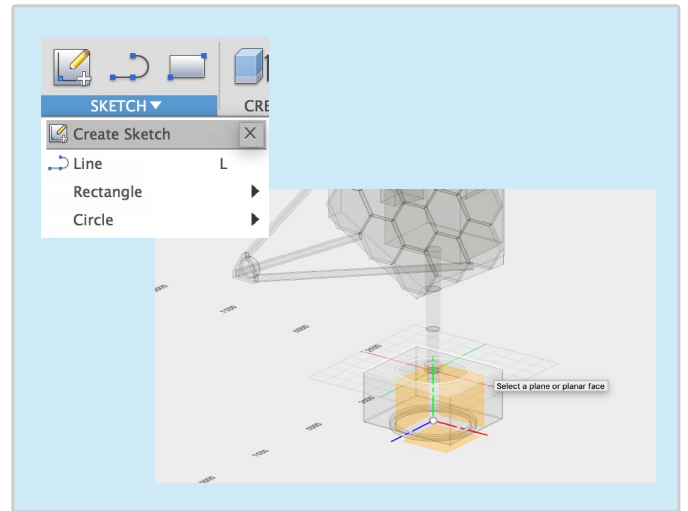


Step 6 Multilayer Sunshield

1 Create a new component named Multilayer Shield.



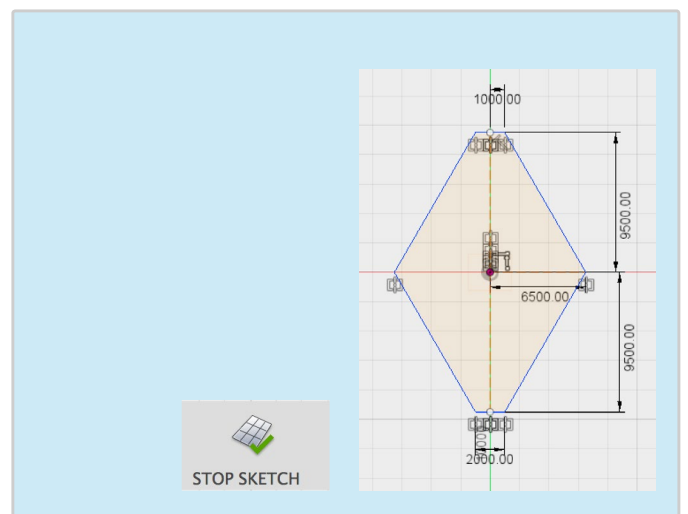
2 Create a new sketch on the top of the Spacecraft bus as shown.



3 Hide all components apart from the Multilayer Sunshield as shown, using the lightbulb to show and hide.

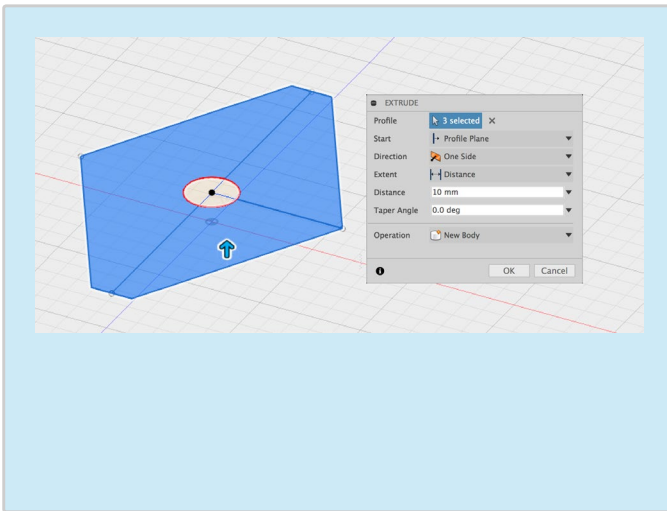


4 Complete the following sketch using the Line and dimension tool. Once completed stop sketch. Start by drawing a line upwards by 9500mm and another line along the red axis by 6500mm.

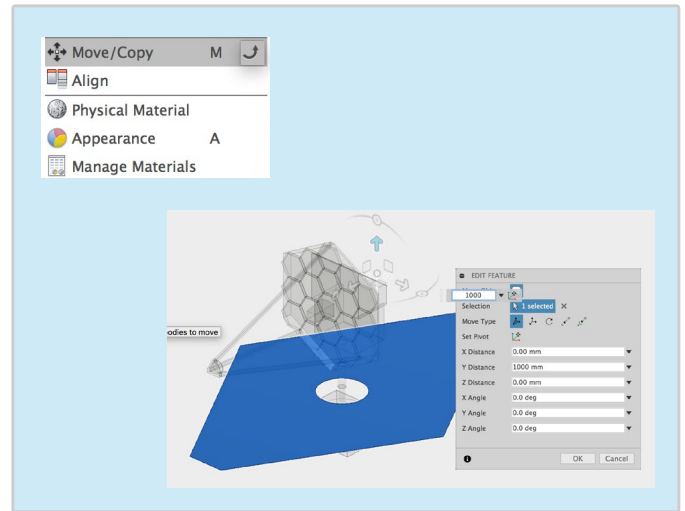


Step 6 Multilayer Sunshield

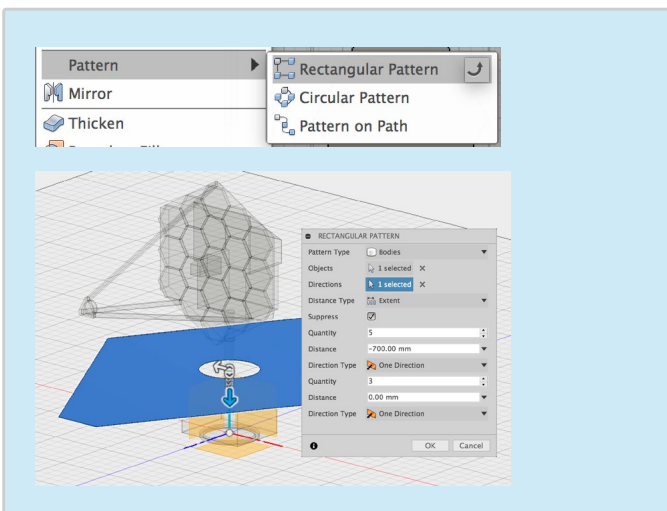
5 Create, extrude the previous sketch by a distance of 10mm. Make sure you only select the profiles shown.



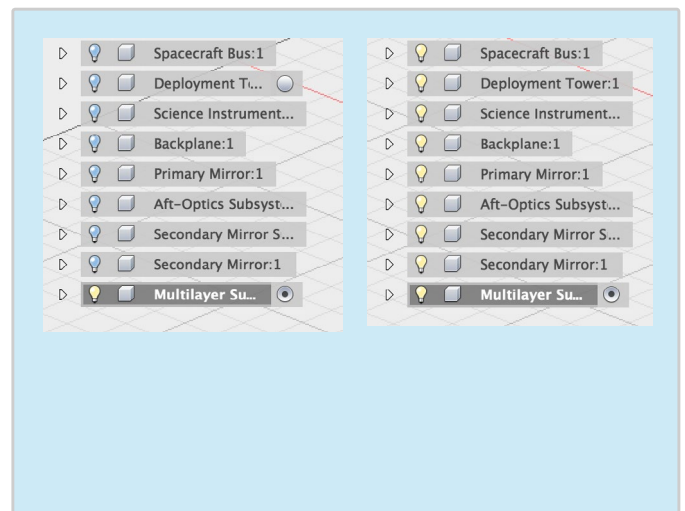
6 Modify, Move/Copy the new body. Change the move type to free move. Move the body upwards by 1000mm.



7 Create, Pattern, Rectangular Pattern. Change the pattern type to bodies. Then select the green axis as the direction. Create a pattern over a distance of -700mm with a quantity of 5.

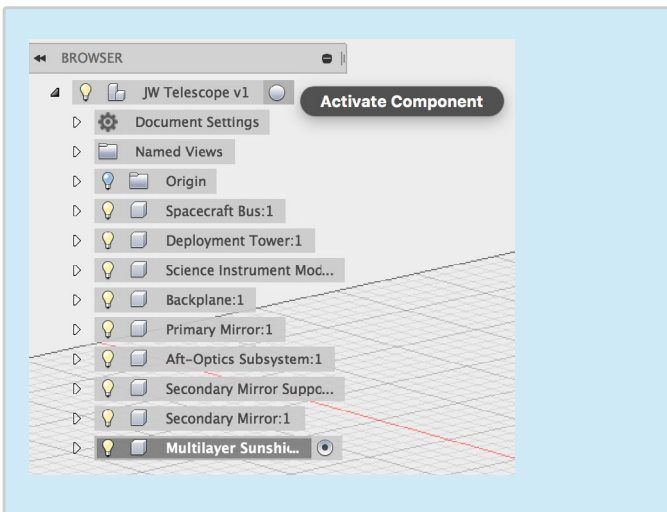


8 Show all components including the Multilayer Sunshield as shown, using the lightbulb to show and hide.

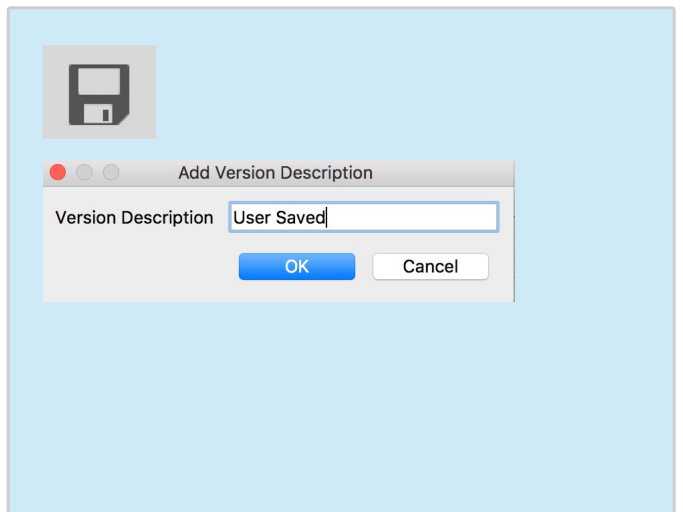


Step 6 Multilayer Sunshield

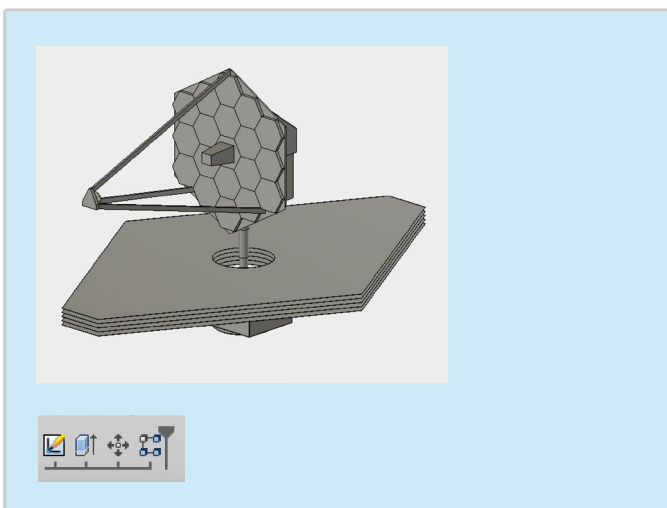
9 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



10 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Multilayer Shield Complete.



Step 6 Completed – Move on to Step 7

Step 7 Unitized Pallet Structure

Lesson Objectives:



Advanced Sketching



Construct an Offset Plane



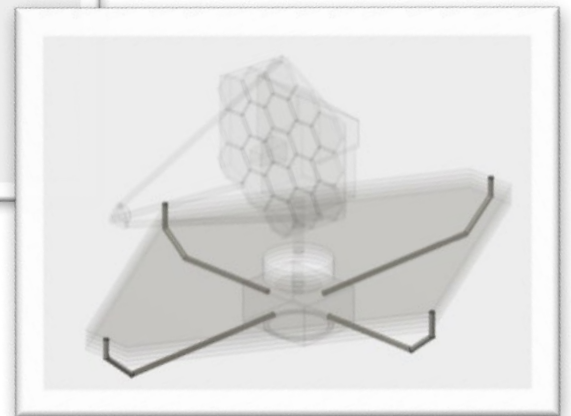
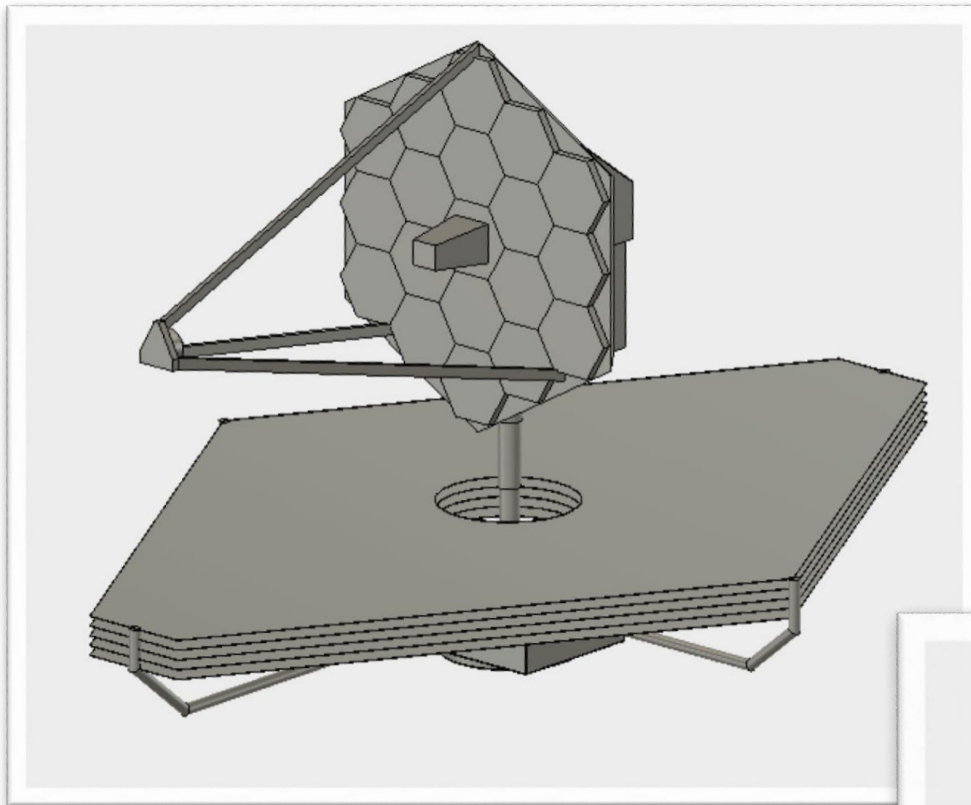
Create a Sweep using a Profile and Path



Mirror Bodies

Unitized Pallet Structure

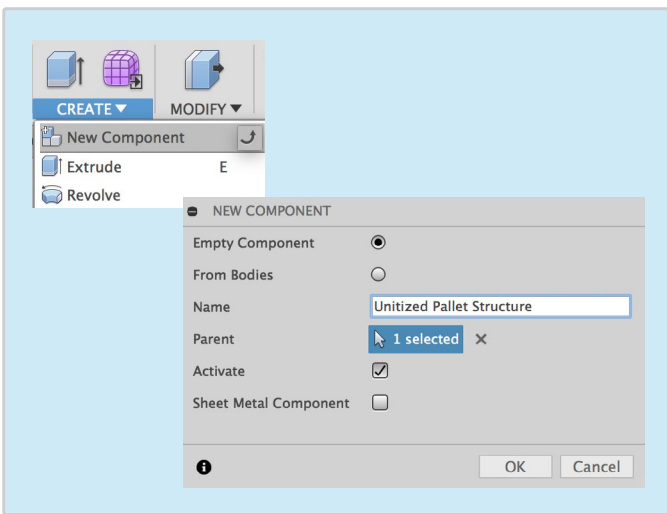
Hold the rolled up Multilayer Sun Shield during Launch. Once in space the structure opens up the Sun Shield



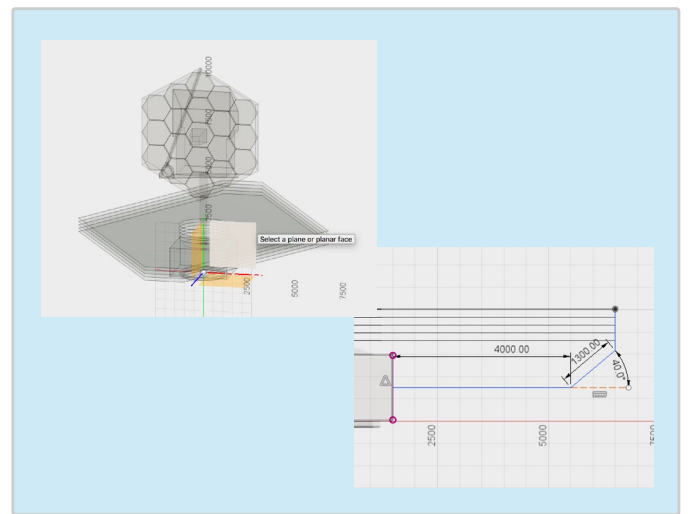
Sketches can be found in resources

Step 7 Unitized Pallet Structure

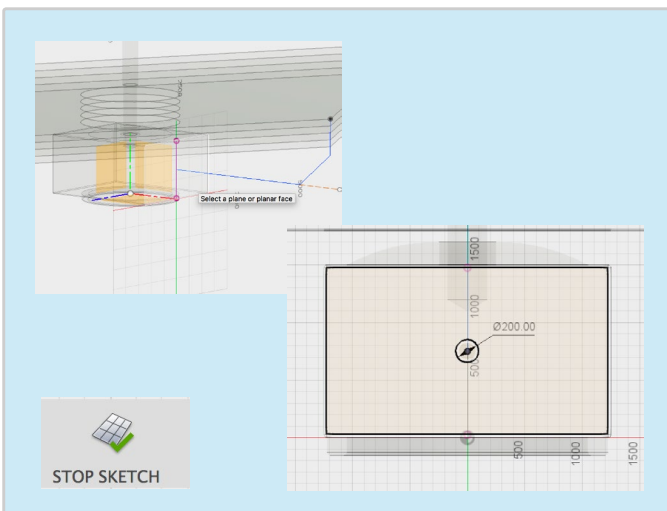
1 Create a new component named Unitized Pallet Structure.



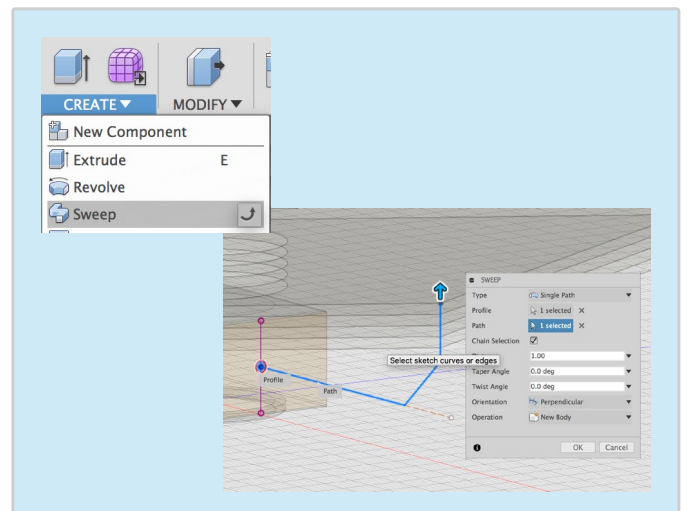
2 Create a sketch on the side plane shown. Showing the Front of the View Cube. Use the line tool to complete the following sketch. The start of the line (or path) should be 400mm from the top of the spacecraft bus.



3 Create a sketch on the side of the Spacecraft Bus shown. Showing the Right of the View Cube. Use a Center Diameter Circle, draw a circle 250mm in diameter on the black dot. (This is the Profile). Click Stop Sketch.

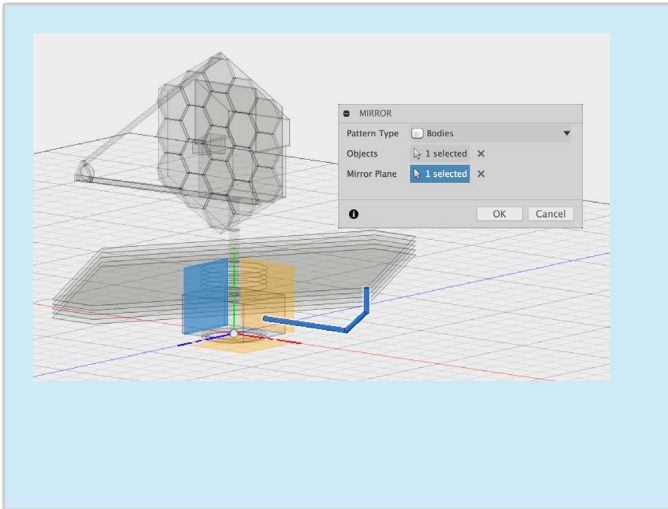


4 Create, Sweep. Keep type on Single Path. Select the profile which is the circle. Then select the path being the first line sketch. Make sure that chain selection is turned on.

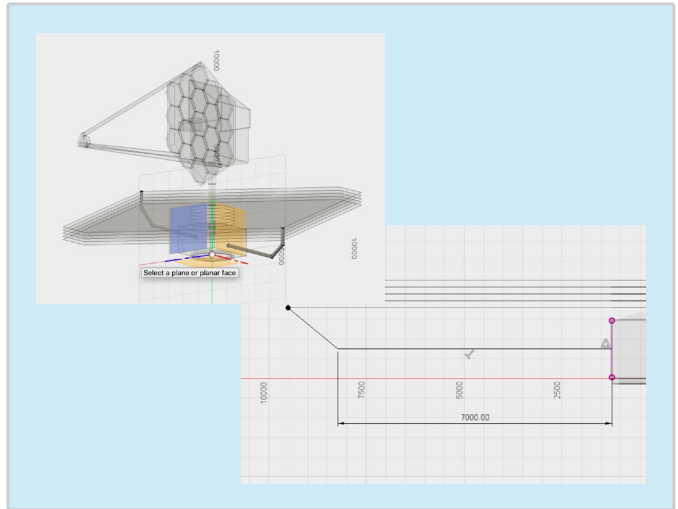


Step 7 Unitized Pallet Structure

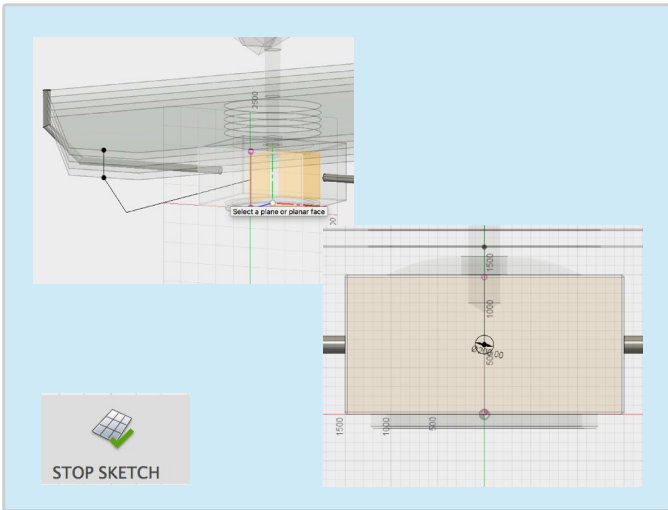
5 Create, mirror. Change the pattern type to bodies. Select the new body as shown. Then select the mirror plane going down the center of the model.



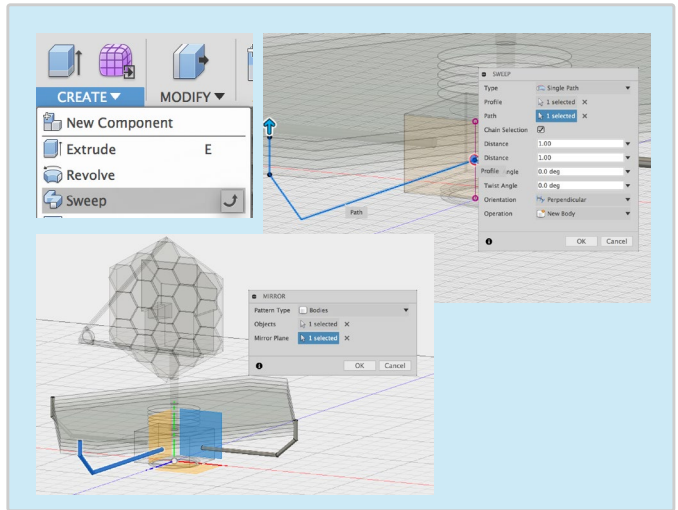
6 Create a new sketch on the side plane shown above. Complete the following sketch using the line and dimension tools. The path should start from the center of the spacecraft bus.



7 Create a new sketch on the front face of the Spacecraft bus as shown. Then create a center diameter circle with a diameter of 200mm on the black dot or center of the Spacecraft Bus. Click Stop Sketch.

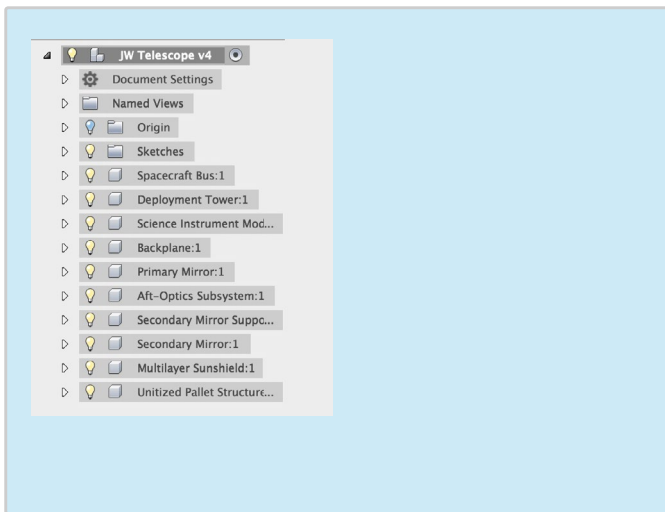


8 Create, Sweep. Keep type on Single Path. Select the profile which is the circle. Then select the path being the first line sketch. Make sure that chain selection is turned on. Then mirror the new body using the mirror tool and plane shown.

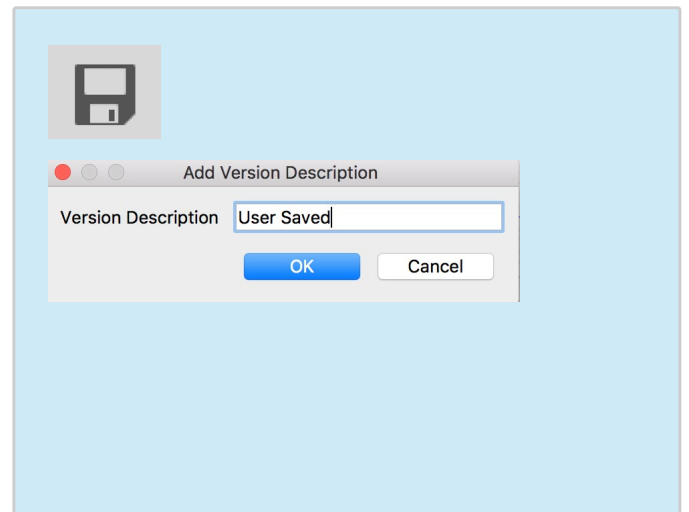


Step 7 Unitized Pallet Structure

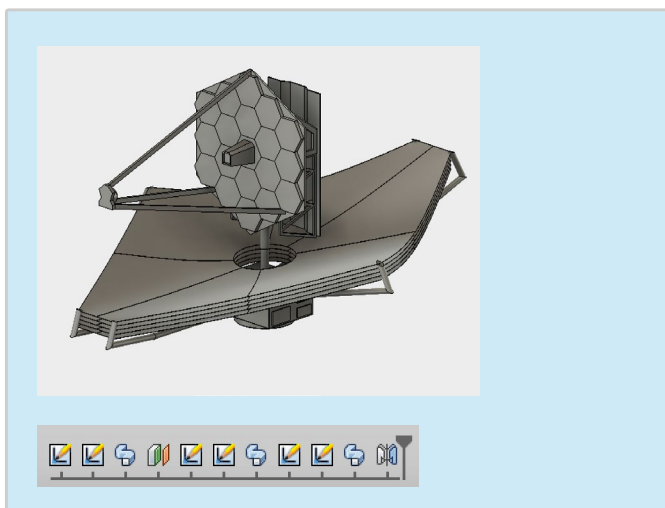
9 Once you've completed all instructions. Make sure that you Activate the overall top component by clicking on the white circle.



10 Make sure to to save your work after every step. Click on the save icon to save your work. It'll ask to add version description, press OK.



Unitized Pallet Structure Complete.

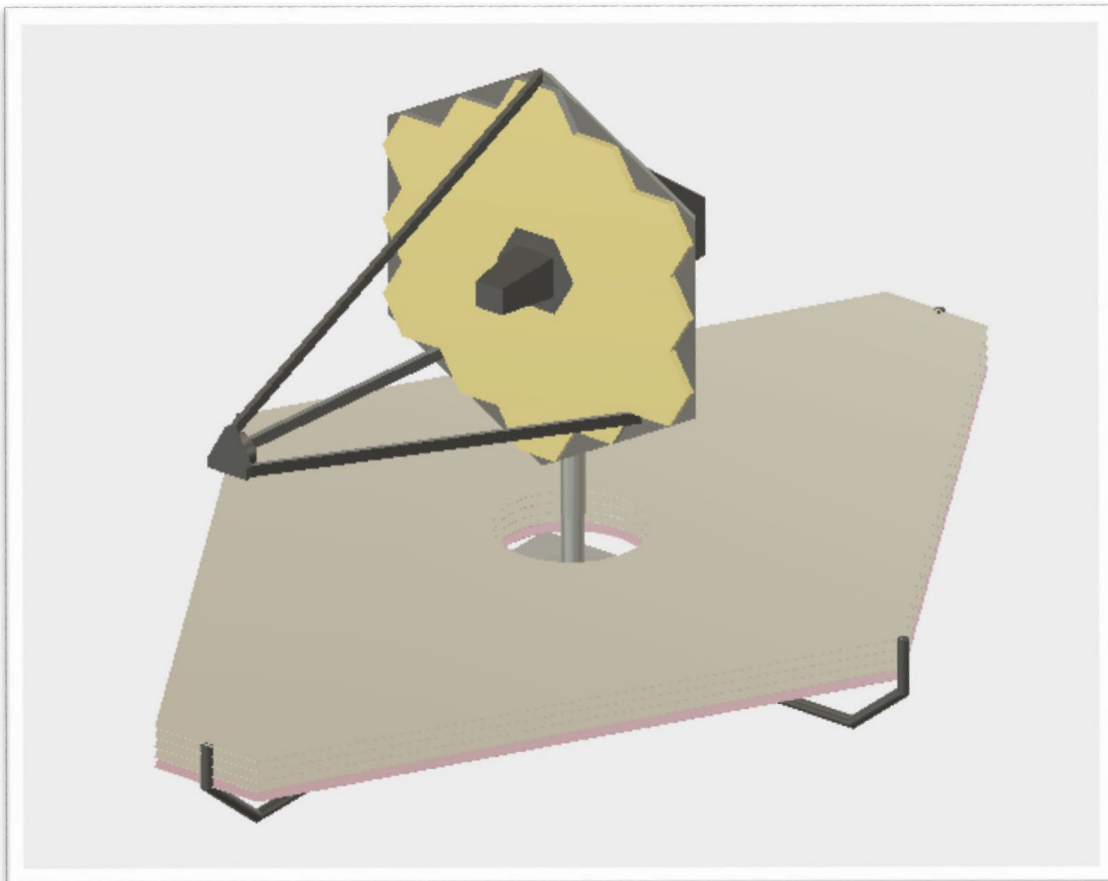


Congratulations! You have modelled the Telescope. Move on to Step 8

Step 8 Rendering

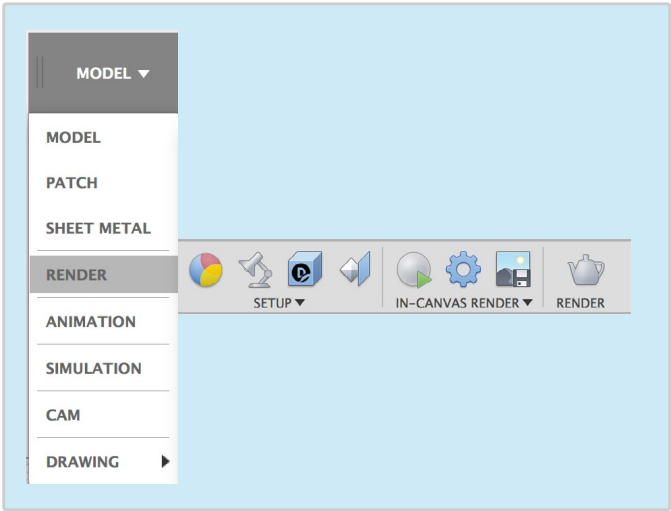
Lesson Objectives:

- ✓ Apply an Appearance
- ✓ Apply a Decal
- ✓ In Canvas Rendering
- ✓ Edit Scene Settings
- ✓ Creating a Background
- ✓ Cloud Rendering

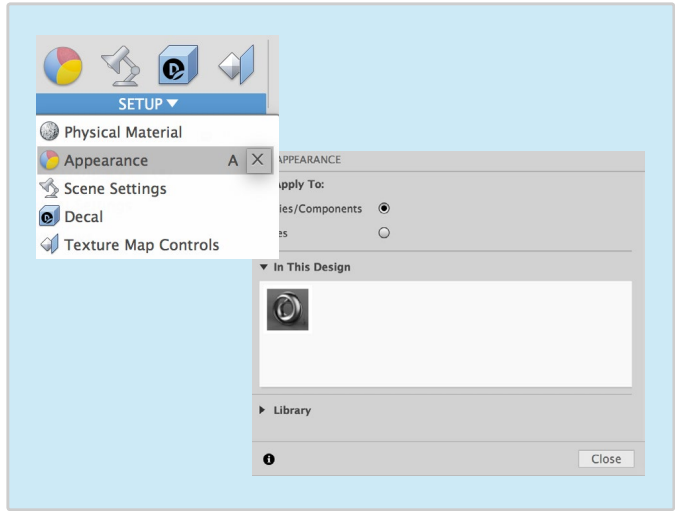


Step 8 Rendering

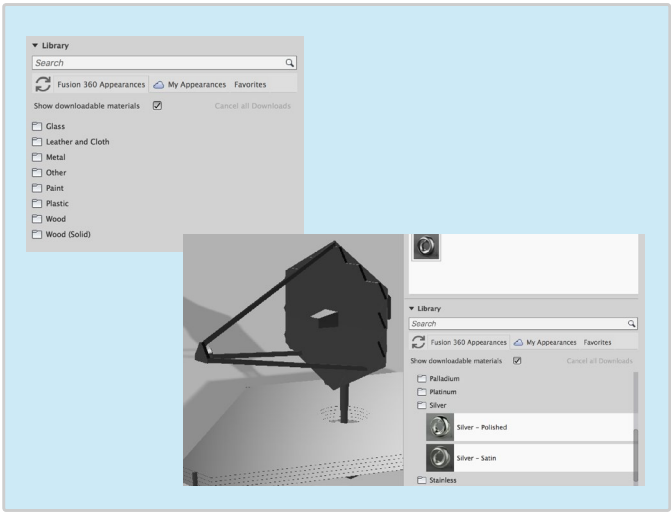
1 Locate Model in the toolbar. Click on model to access the different workspaces. Click on render to change to the render workspace. Notice the toolbar has changed.



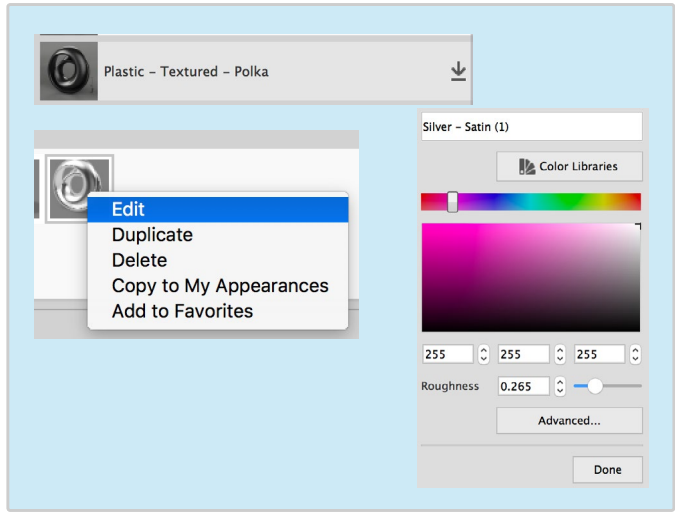
2 Starting from the left, we can apply appearances by click on the multicolored sphere. This will open the appearance menu.



3 To apply an appearance, click on library to access the different materials. Find a material that matches the telescope and drag it on to the part you want to change the appearance of.

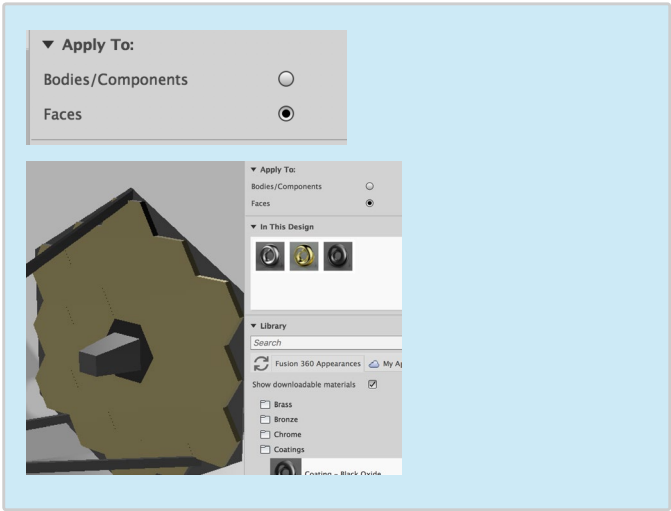


4 More appearances can be downloaded using the arrow. Right click on an appearance in the 'in this design' box to edit a material. Here you can change the colour of the material, increase the roughness etc.

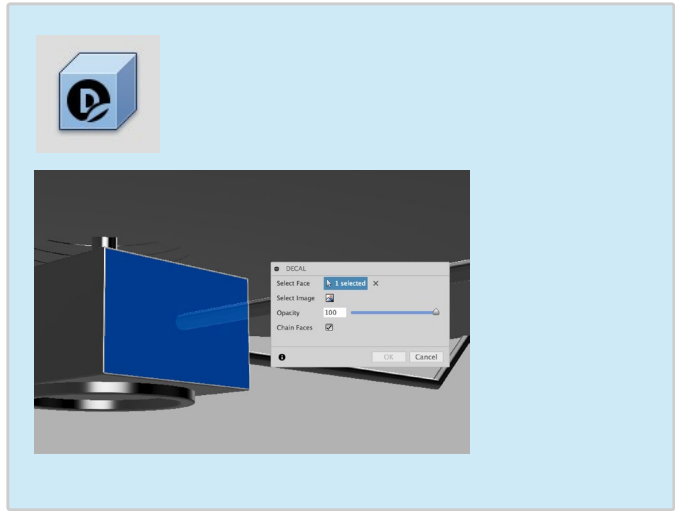


Step 8 Rendering

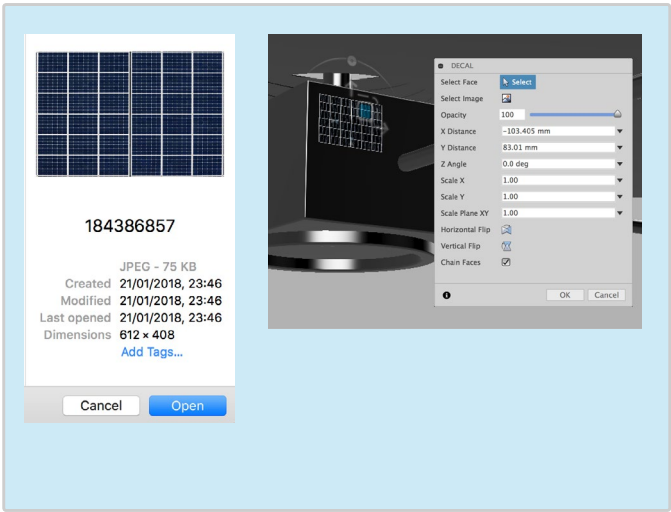
5 Appearances can be applied to bodies, components and faces. To apply an appearance to a face, change the 'apply to' from bodies to faces.



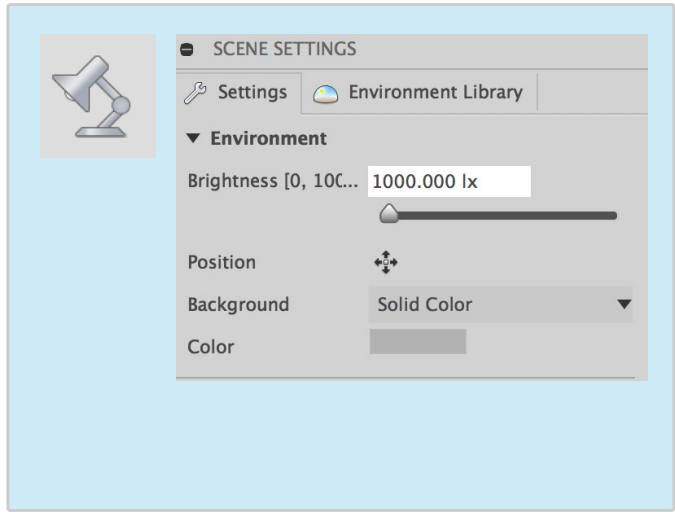
6 Decals can be added to a face. Click on the blue box with a D to add a Decal. Select the face you'd like to apply a decal to.



7 Click select image, find the image you'd like to apply on your computer. Download and image from the internet. You can also move the decal using the arrows and scale the image as well.

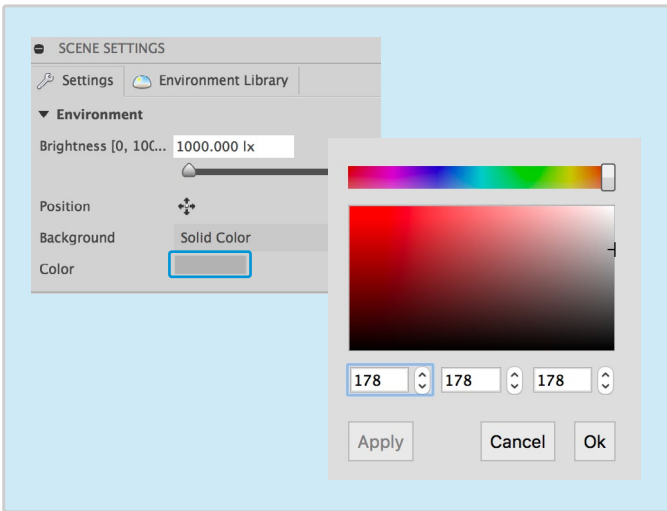


8 Click on the Lamp Icon to open the Scene Settings. In this menu you can change the settings of the scene/environment such as brightness.

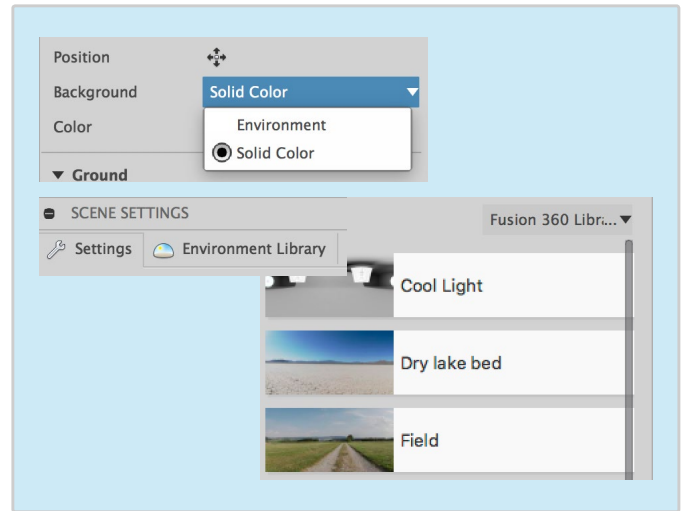


Step 8 Rendering

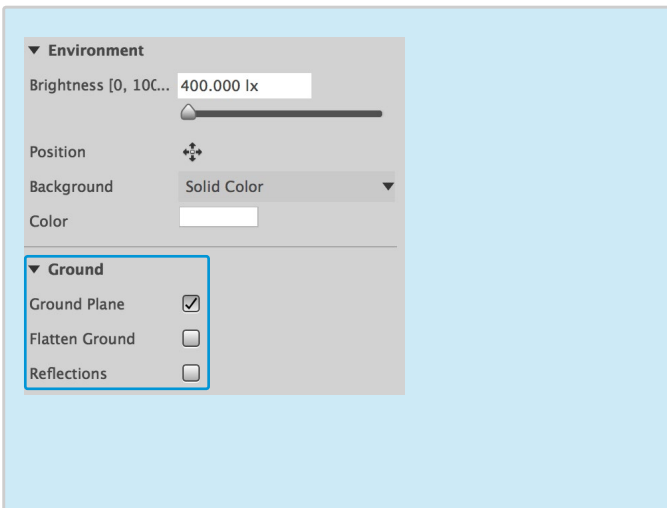
9 Change the color of the background by clicking on the grey box. Then use the slider to select any color you like.



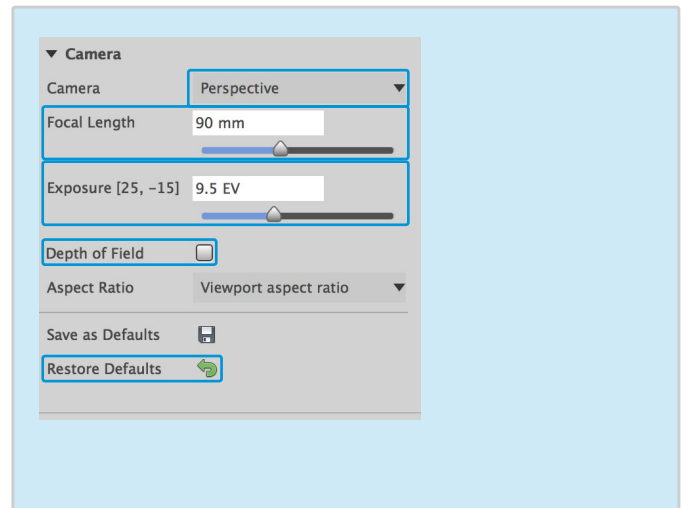
10 Change the background from solid color to environment. You can change the environment by click on the Environment library at the top. Then drag a environment onto the background.



11 In Scene Settings we can also add and take away the ground plane. As our telescope is in space our render won't require a Ground Plane.

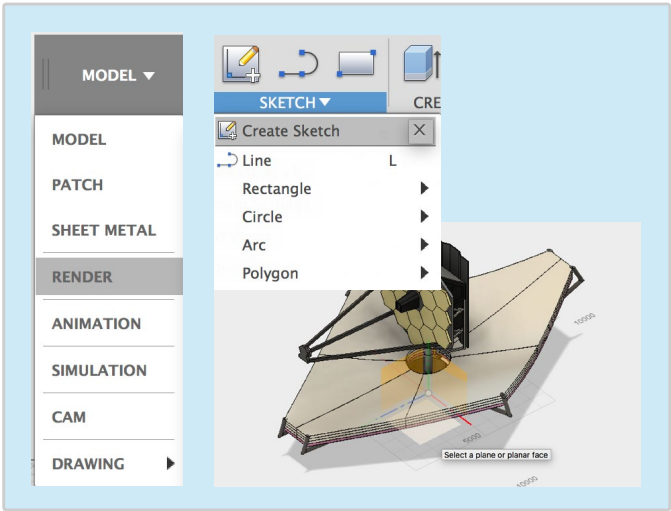


12 We can also change the Camera Settings within Scene Settings. We can change from perspective to orthographic, increase or decrease the focal length and change the exposure. Depth of Field allows you to add blur to your render. If you don't like the changes you've make you can always restore defaults.

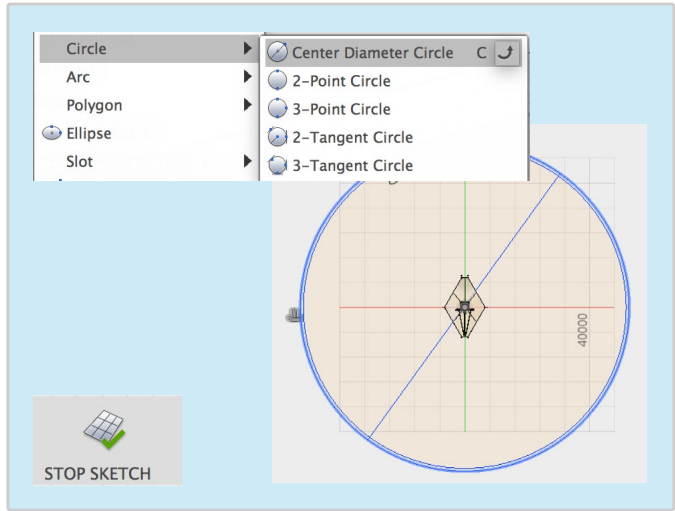


Step 8 Rendering

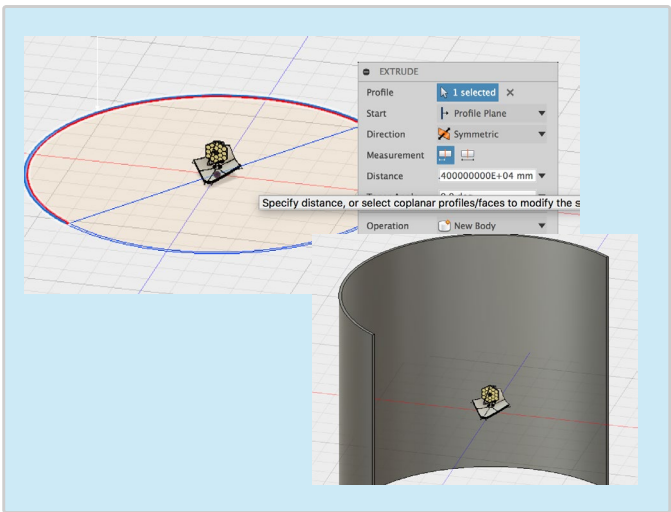
13 Change back to the model workspace. Create a new sketch on the bottom plane as shown.



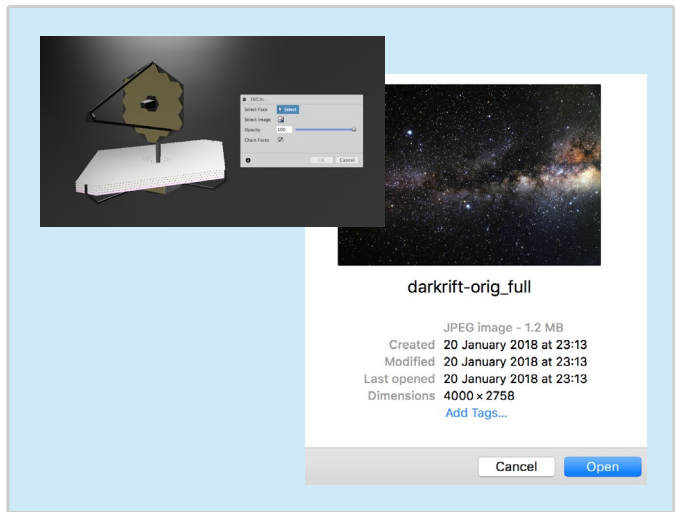
14 Create two large center diameter circles around the origin. Then draw a line going through the center as shown.



15 Create, Extrude, half of the previous sketch creating a semi circle wall. Change the direction to symmetric and extrude both sides as shown.

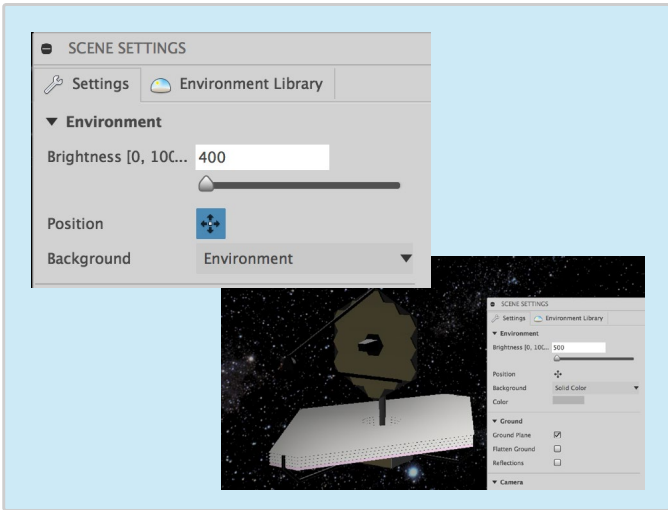


16 Change back into the Render Workspace. Then find a picture of space on the internet and save it to your computer. Attach a decal to the inside face of the extrude wall. Scale up the decal so it covers the entire wall. Turn Chain Faces off.

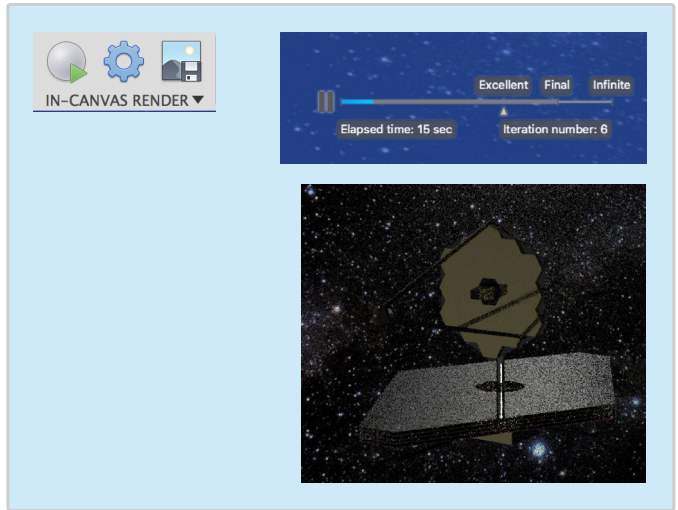


Step 8 Rendering

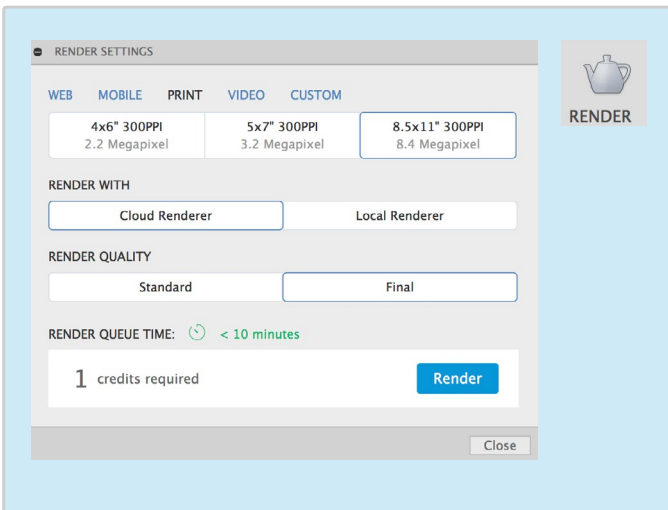
17 Go back into Scene Settings and turn the brightness of the environment down to make the telescope look like its in space. Click on position to change the position of the light.



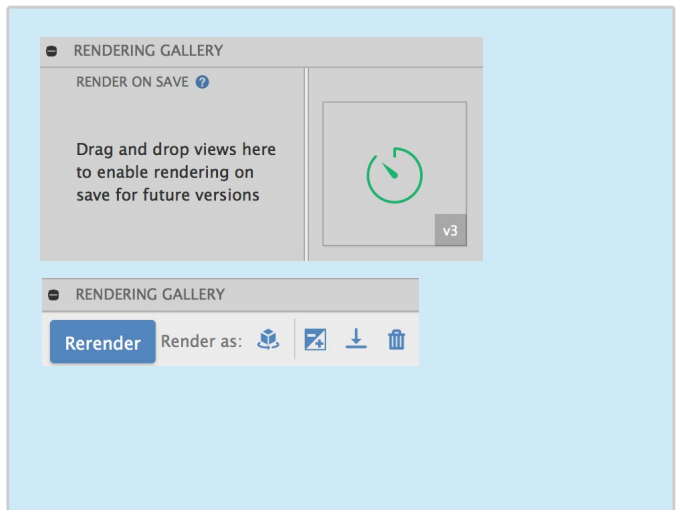
18 Choose a good angle of your telescope to render. To render locally, click on the sphere with a play button. This will start an in canvas render. Notice the picture has pixelated, but improves over time. The longer the in canvas render is on, the better the render.



19 To start a cloud render, click on the tea pot. This will open the render settings. Click on Print, then select the highest megapixel camera, Cloud Render & Final. Finally, click render to render your scene in the cloud.



20 Open the Rendering Gallery to access the renders you've sent to the Cloud. Notice the Clock, once the scene has been render in the cloud, your render will be available to download here.



Step 9 Animation

Lesson Objectives:

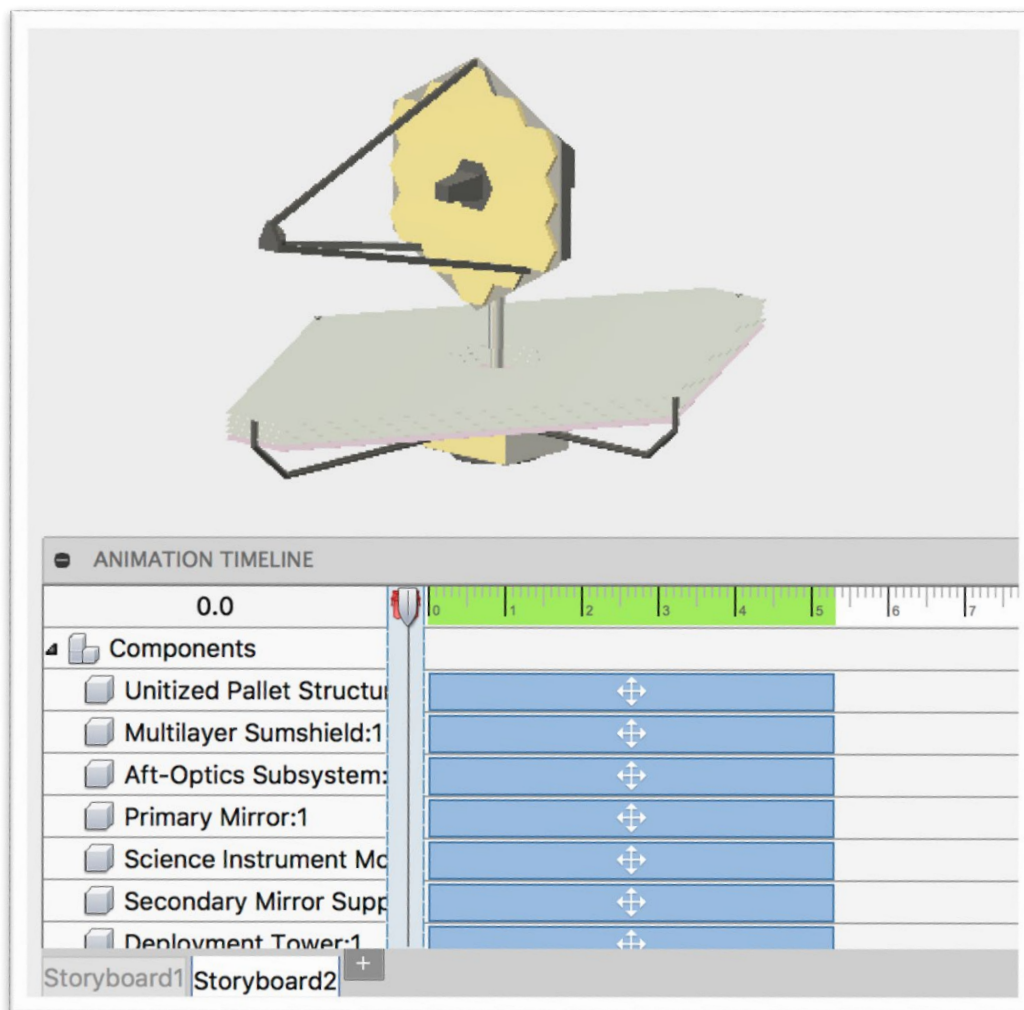
 Understanding the Animation Timeline

 Create an animation

 Create a Storyboard

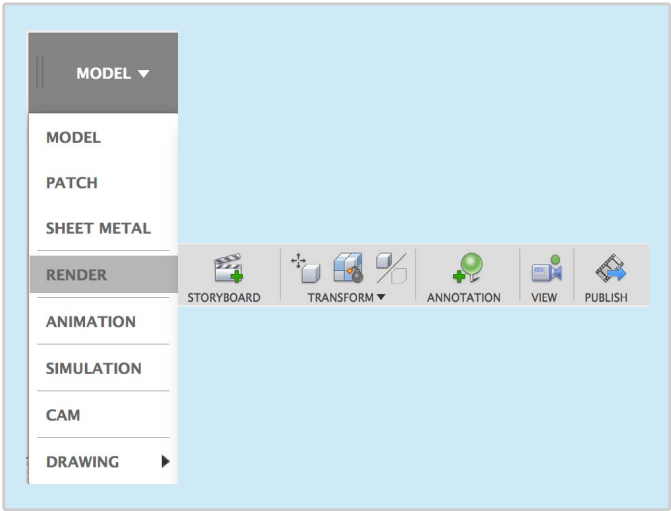
 Explode Components

 Publish an Animation

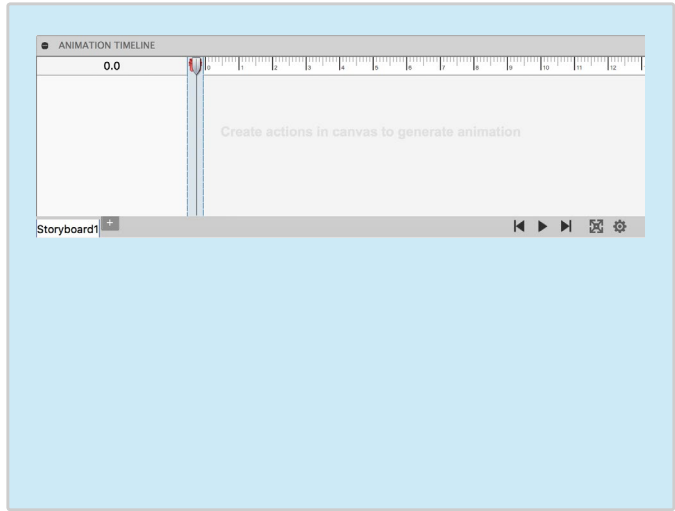


Step 9 Animation

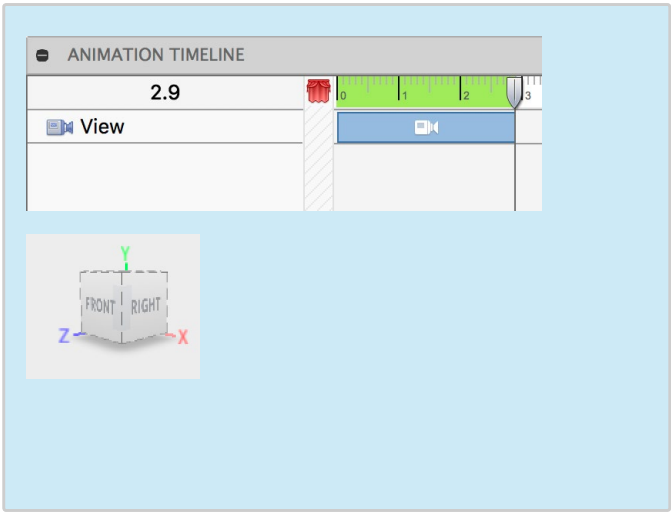
1 Locate Model in the toolbar. Click on model to access the different workspaces. Click on render to change to the render workspace. Notice the toolbar has changed.



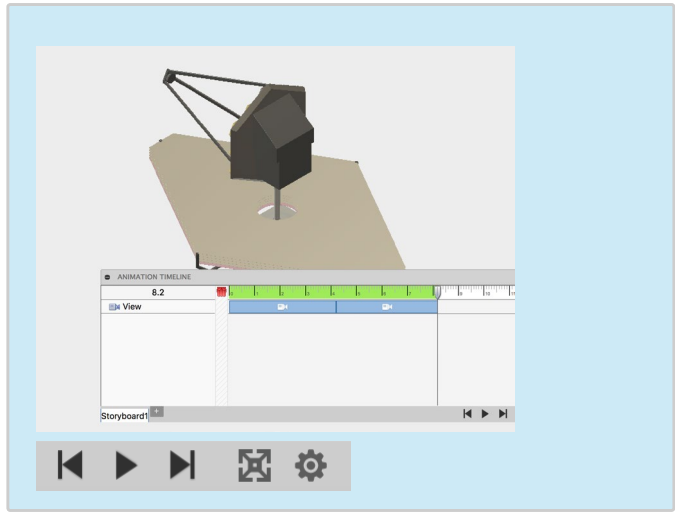
2 At the bottom of the animation workspace is the Animation Timeline. This allows you to create multiple storyboards and playback your animation.



3 Drag the cursor on the timeline to anywhere you like. Change the camera angle using the view cube. Fusion will automatically create the transition between the two camera views.

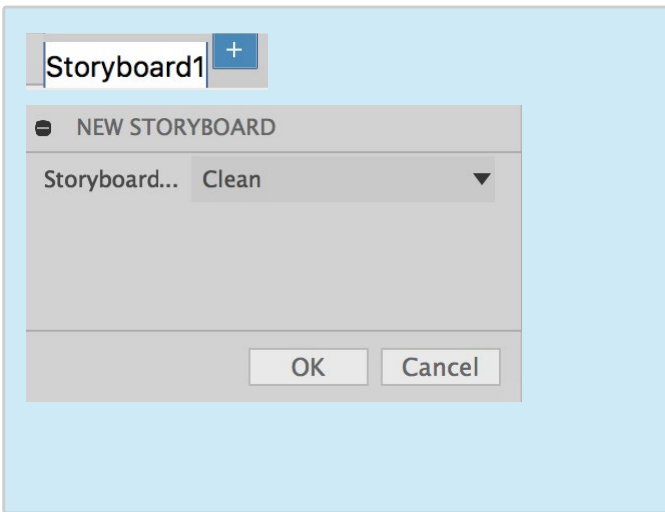


4 Continue to move the cursor down the timeline and change the camera view. Try to make a 360 video going around your telescope. Play back your animation by clicking on the play button.

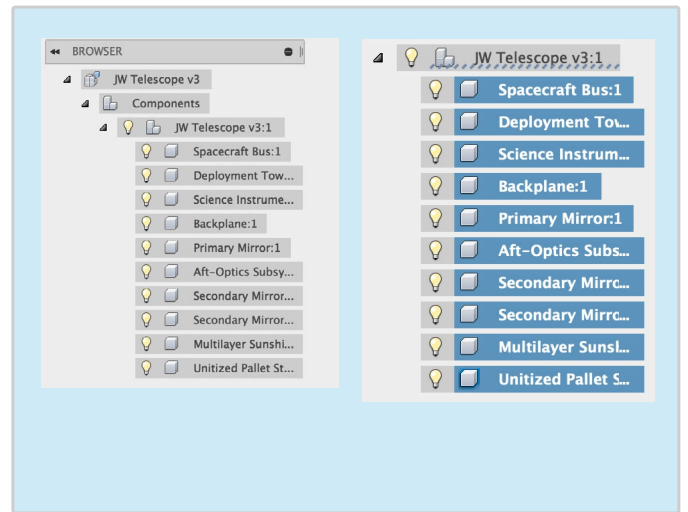


Step 9 Animation

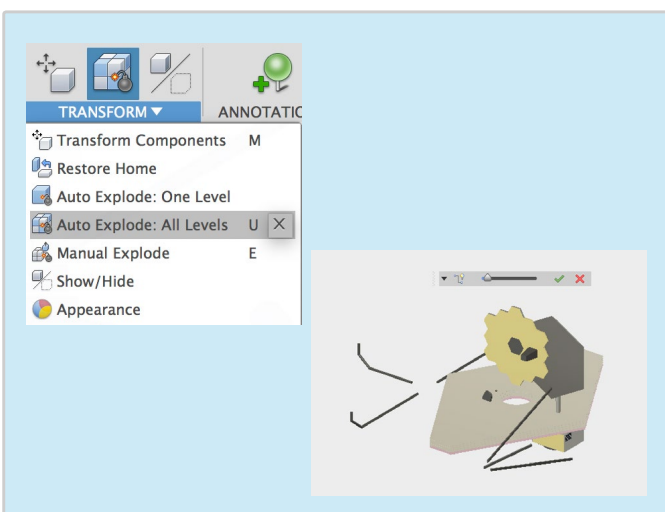
5 To create a new storyboard click on the + next to storyboard 1. Make sure the new storyboard is set to clean and click OK.



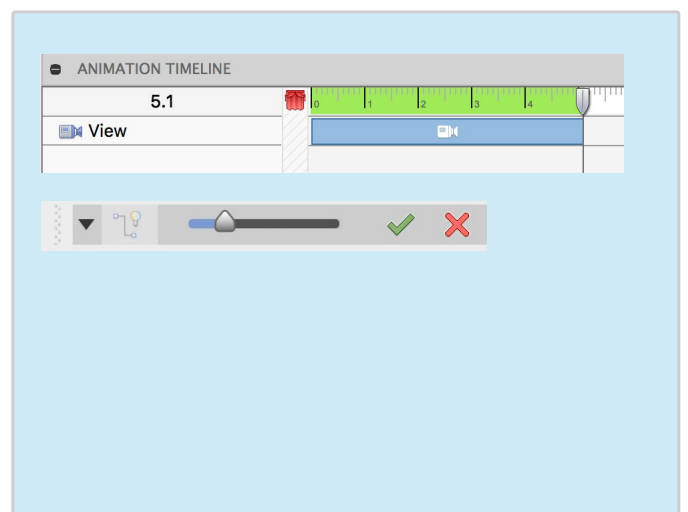
6 Open up Components in the Browser and Open Telescope to view all the components. Select all the components (hold shift).



7 Transform, Auto Explode: All Levels will explode all components, use the slider to increase how far the components explode.

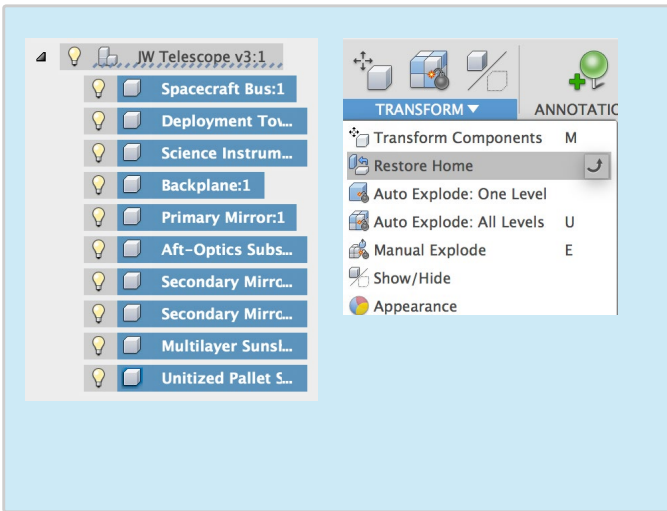


8 Make sure to change the time on the animation timeline by using the cursor, Once your happy with the time, click the tick. Try playing the animation.

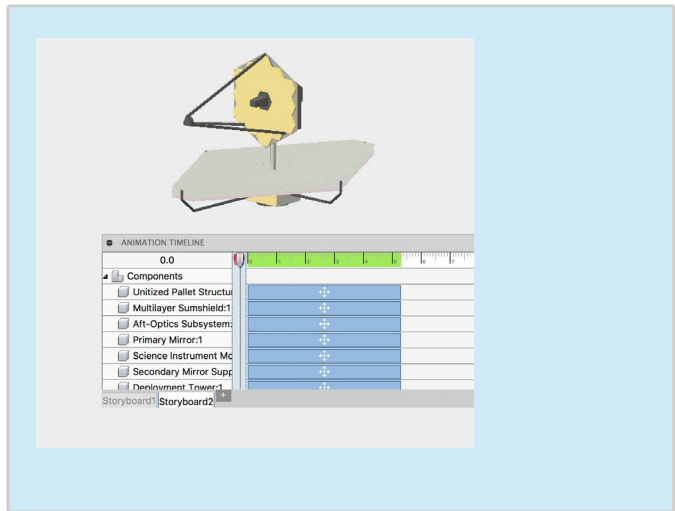


Step 9 Animation

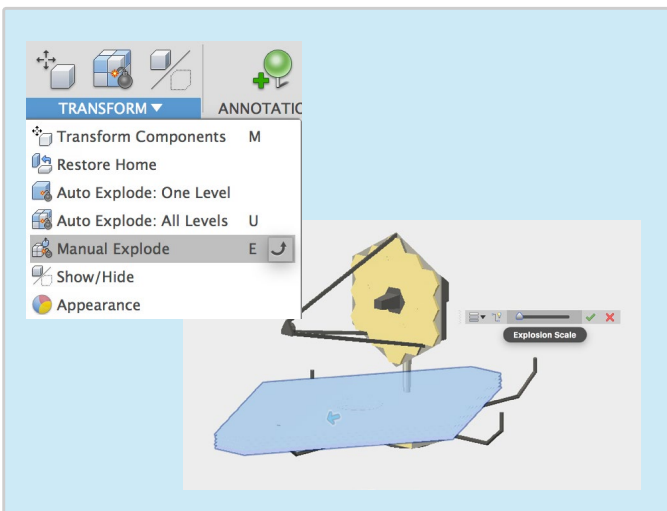
9 Select all the components, then Transform, Restore Home to put all the components back in the right play. Make sure to move the cursor in the animation timeline along.



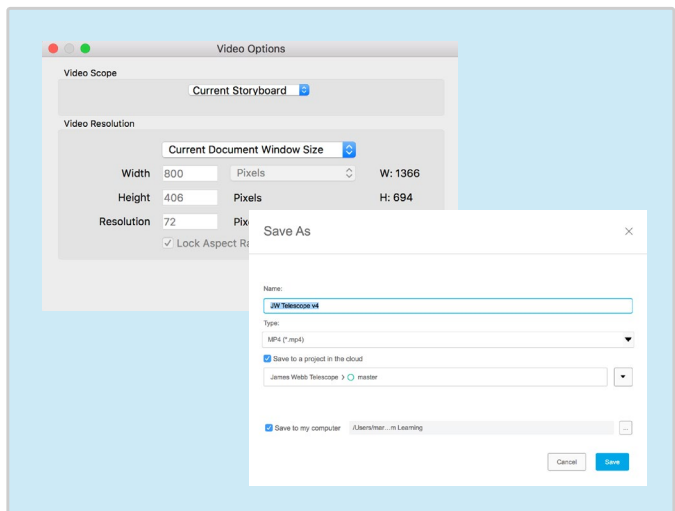
10 Try playing back the animation using the Play button on the animation timeline. Notice the parts explode and then come back together again.



11 Instead of auto explode, try manually exploding parts by selecting the component you want to explode, then choose the direction you'd like it to move in. Use the slider to change the scale.



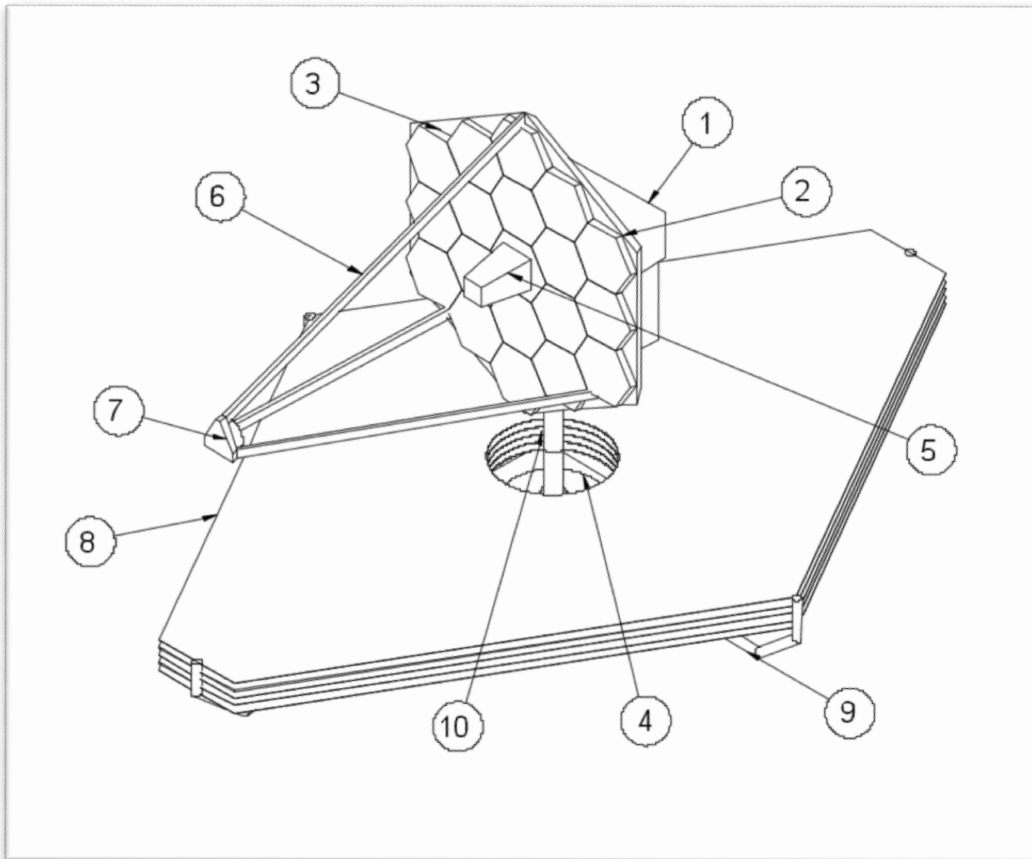
12 Click on publish to turn your current storyboard into a video. Change the Window size if you like then press OK. Fusion will then give you the option to save the video to the cloud or your computer and what file type you'd like the video.



Step 10 Engineering Drawings

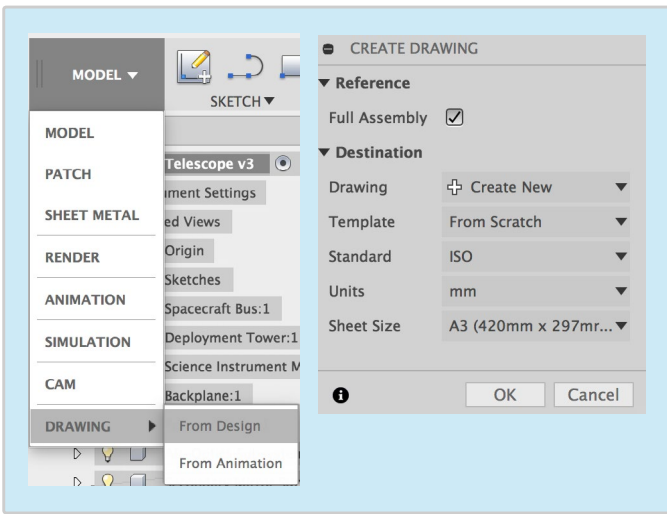
Lesson Objectives:

- ✓ Create a Drawing
- ✓ Add Projected Views
- ✓ Create a Parts list
- ✓ Export and Print Sheets
- ✓ Create a Base View
- ✓ Add Dimensions
- ✓ Add Balloons and Annotations

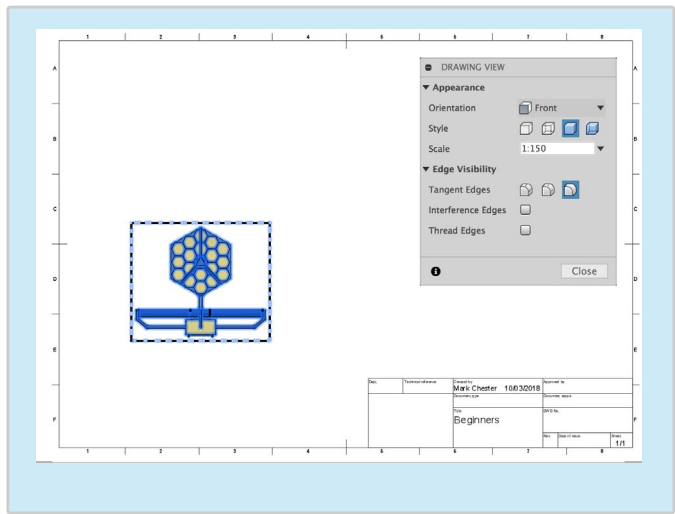


Step 10 Engineering Drawings

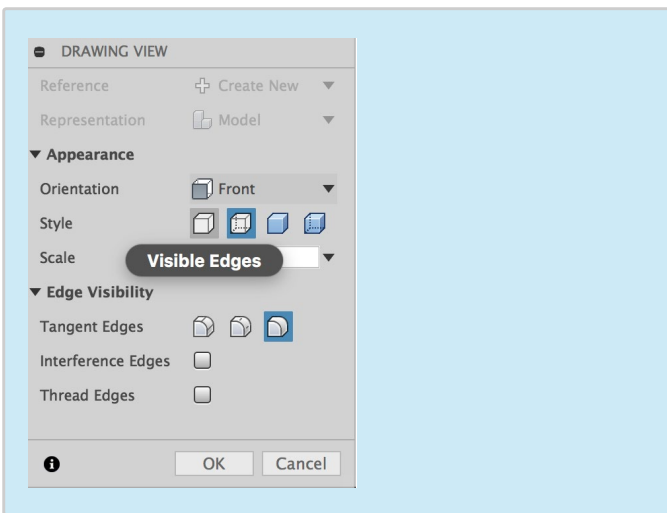
1 Change to the Drawing Workspace, From Design. The Create Drawing Menu will appear. Press OK to enter the drawing workspace.



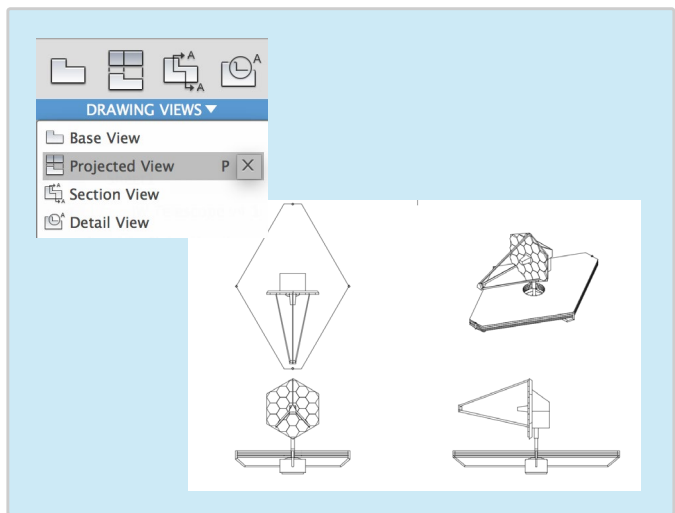
2 First select a place on the page to create a base view. This can be anywhere on the page.



3 Change the orientation of the Base View by clicking Front. Change the style of the base view by selecting one of the cubes. Change the scale of the base view to 1:150 to get a better view.

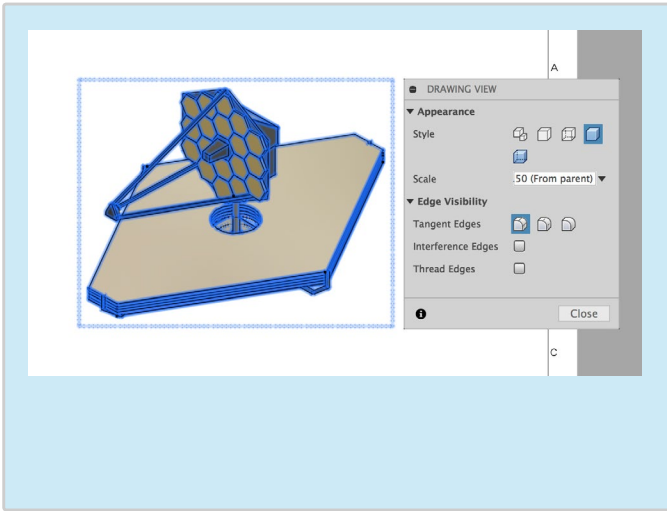


4 Drawing Views, Projected View. Allows you to create multiple views of your base view. Click on the base view and place different views on the page. Once your happy press enter on your keyboard to create the views.

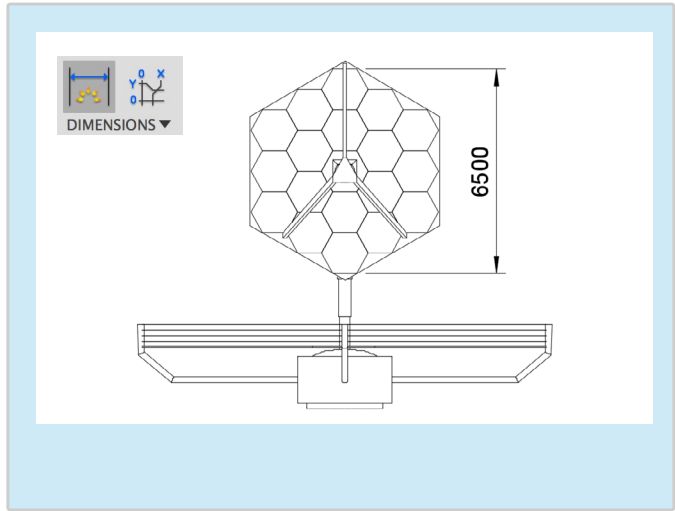


Step 10 Engineering Drawings

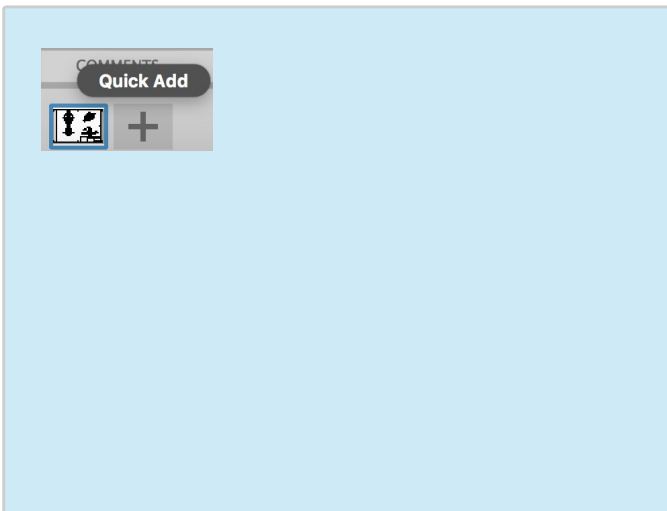
5 Double click on a projected view to edit it. In drawing view you can change the scale and style of the drawing.



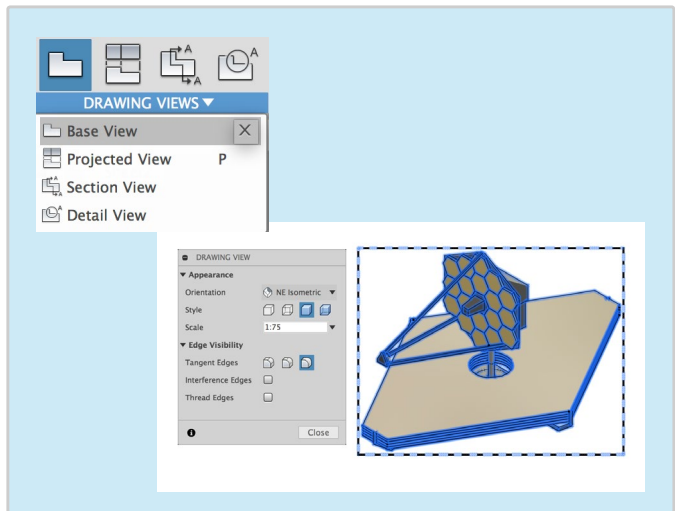
6 Add dimension to your drawing by clicking on Dimensions. Select an edge or specify to points which you'd like to create a dimension of.



7 Add a new page to your drawing by clicking the big + icon in the bottom left hand corner.

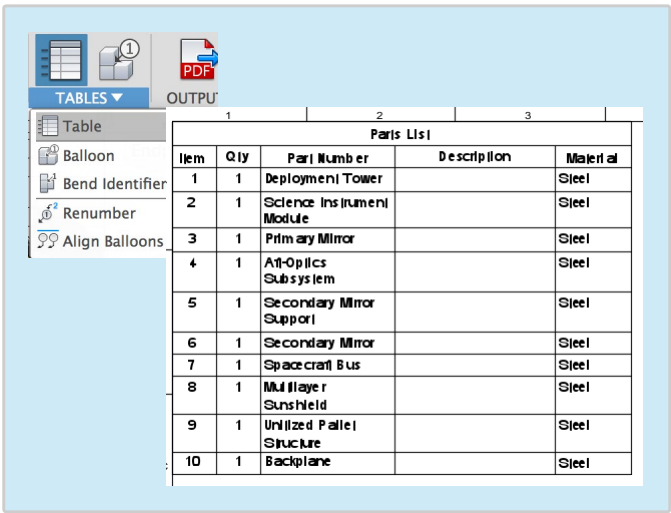


8 Create a new base view by going to Drawing view, Base View. This time change the orientation to a Isometric View and increase the scale to 1:75.

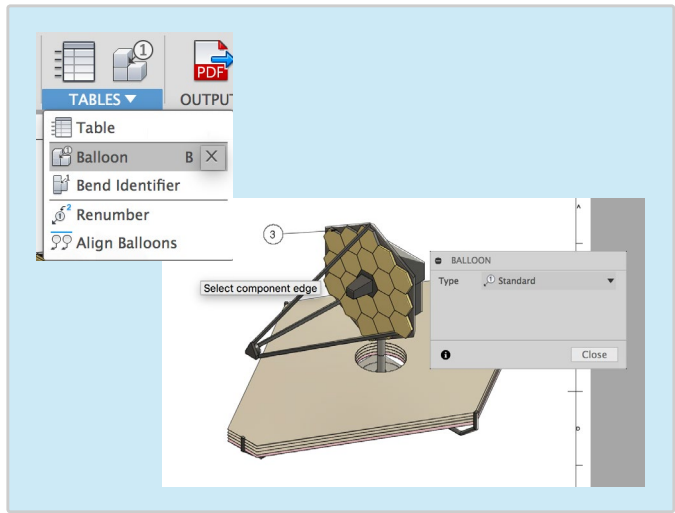


Step 10 Engineering Drawings

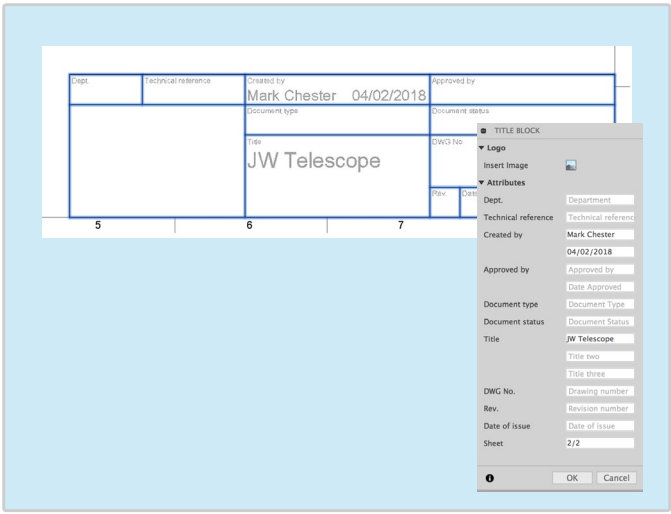
9 Go to Tables, Tables to insert a Parts list table. This will automatically create a list of parts needed to create the telescope.



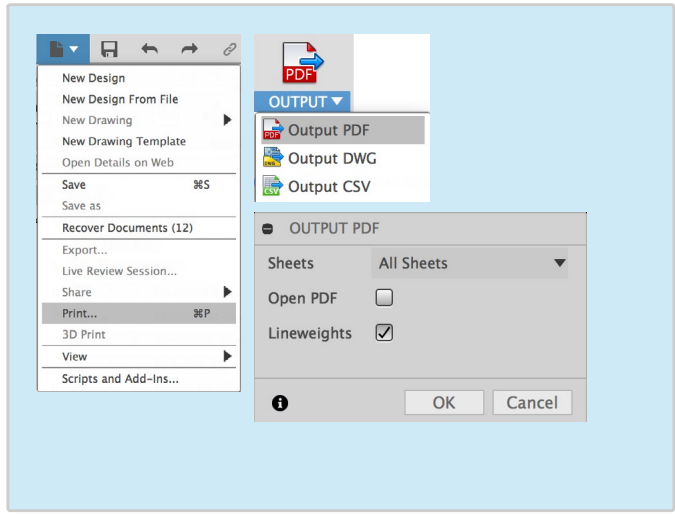
10 To label your Telescope. Go to tables, balloons. This will allow you to select the component you'd like to label. This will. Create a balloon with a number referenced in your parts list.



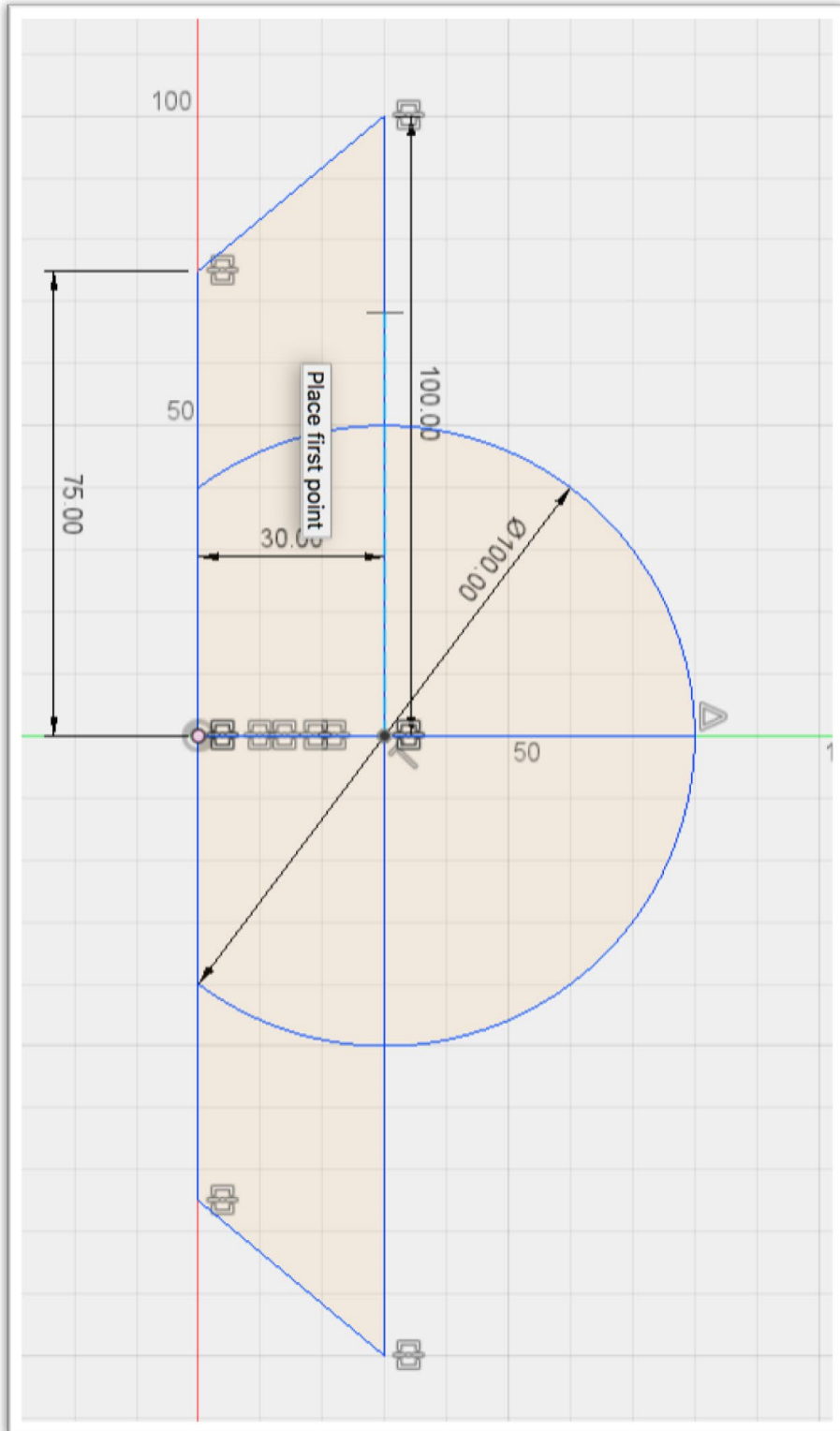
11 To change the Title Block located in the bottom right hand corner. Double click anywhere on the block. This will bring up the title block menu which you can fill in.



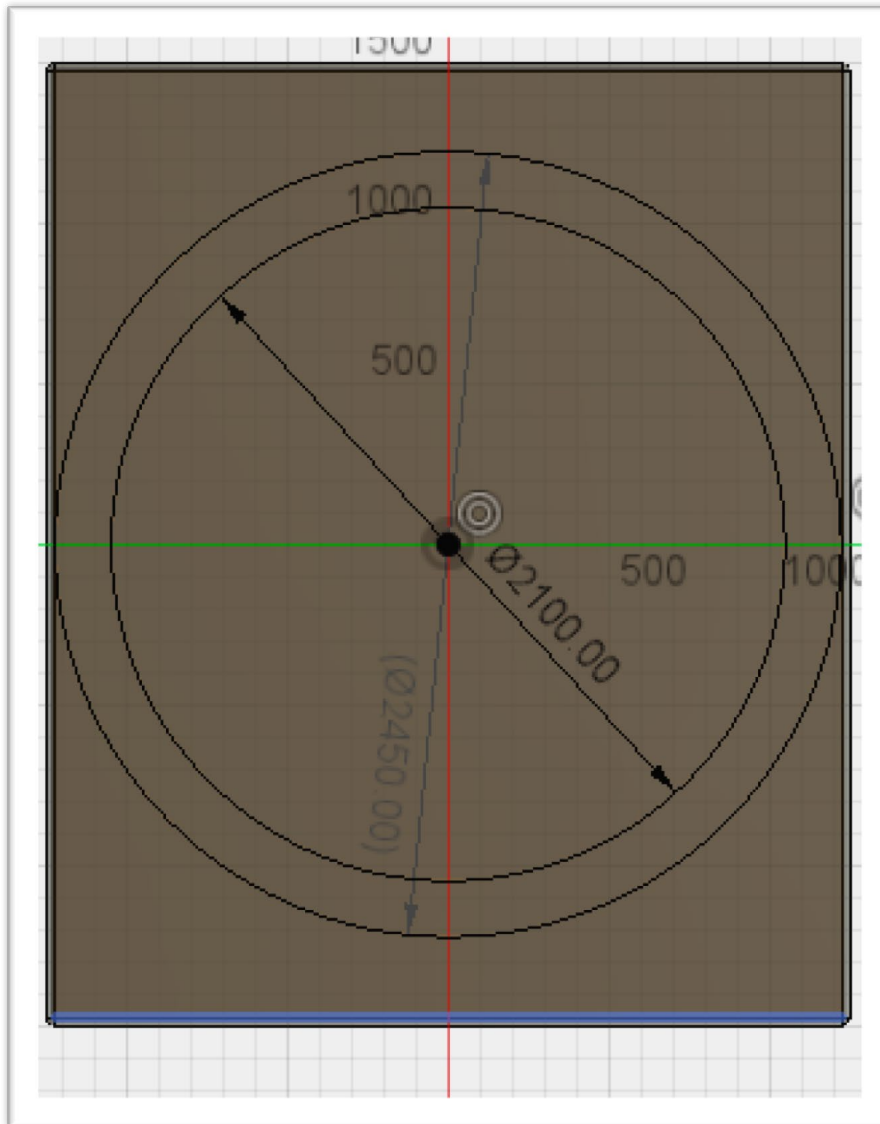
12 Once you're happy with your drawing, go to file and then print to print your drawing. Or go to output and then PDF to export your drawing as a PDF.



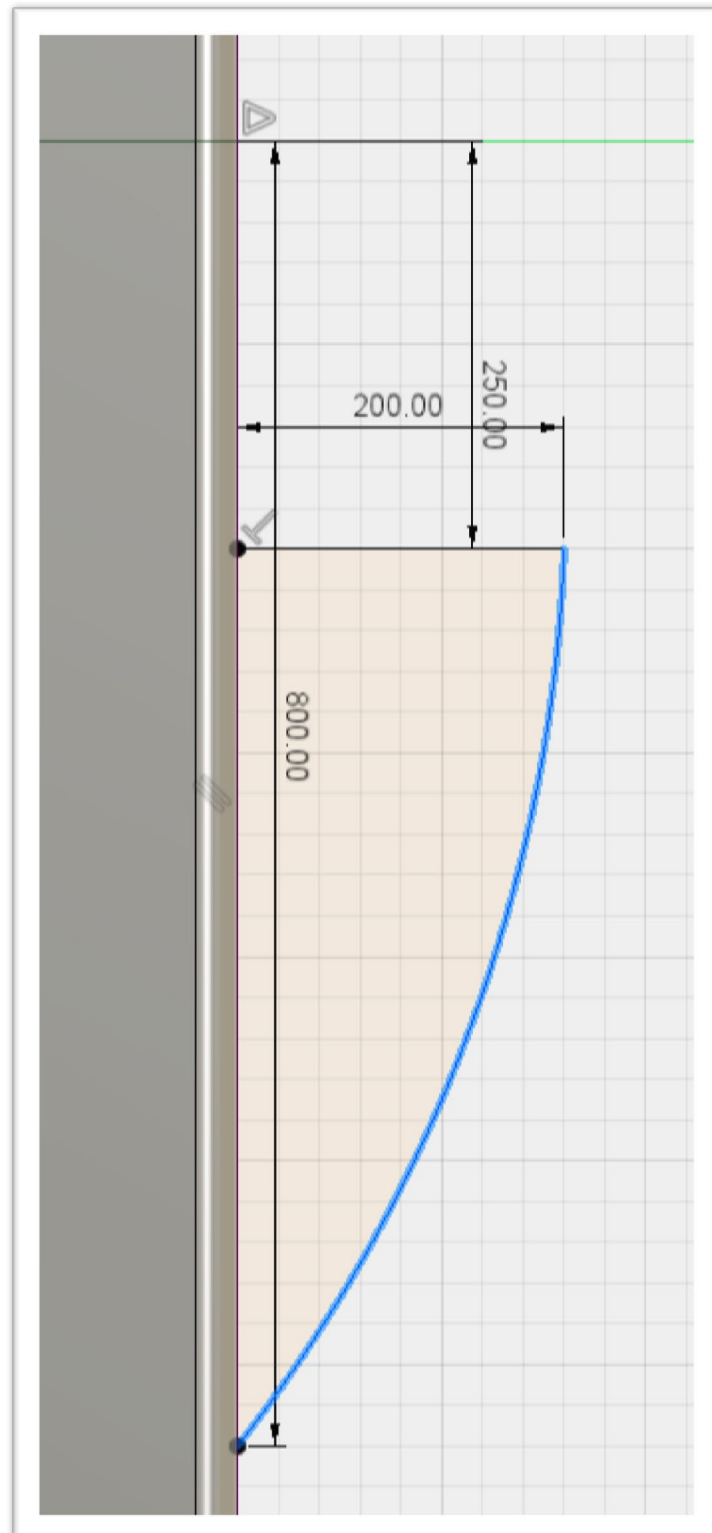
Resources (Sketches) Getting Started



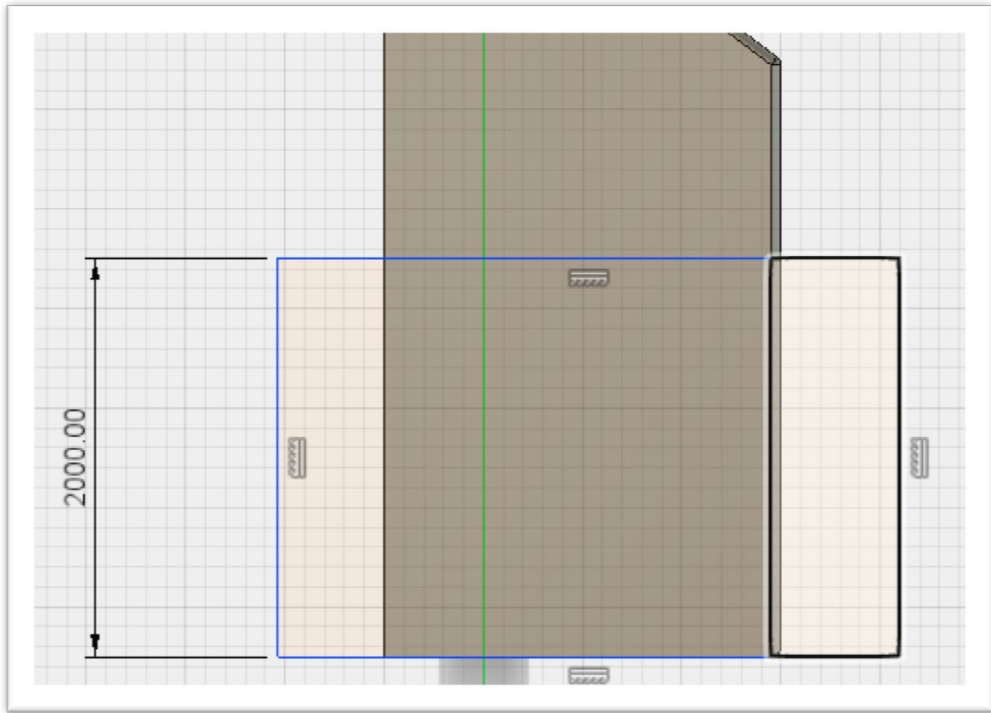
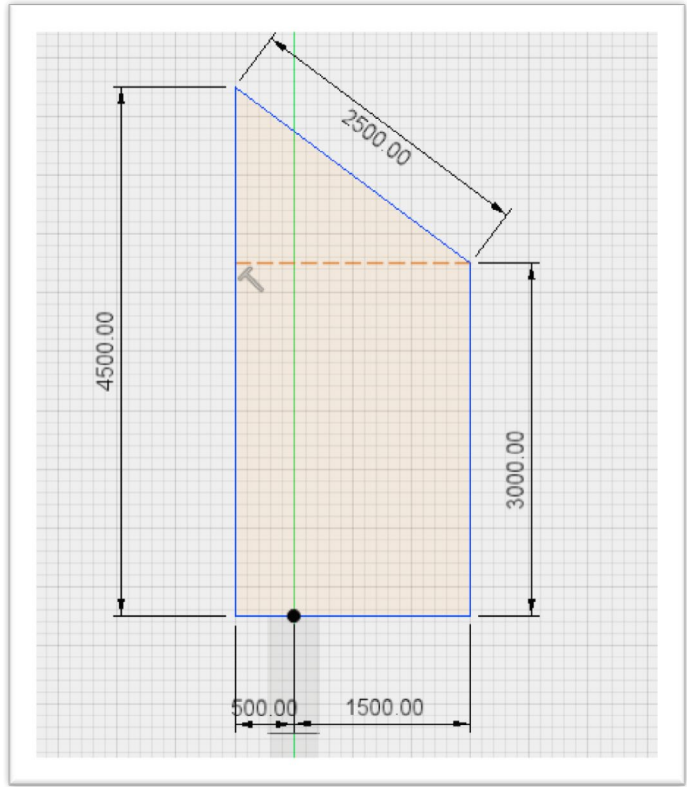
Resources (Sketches) Step 1



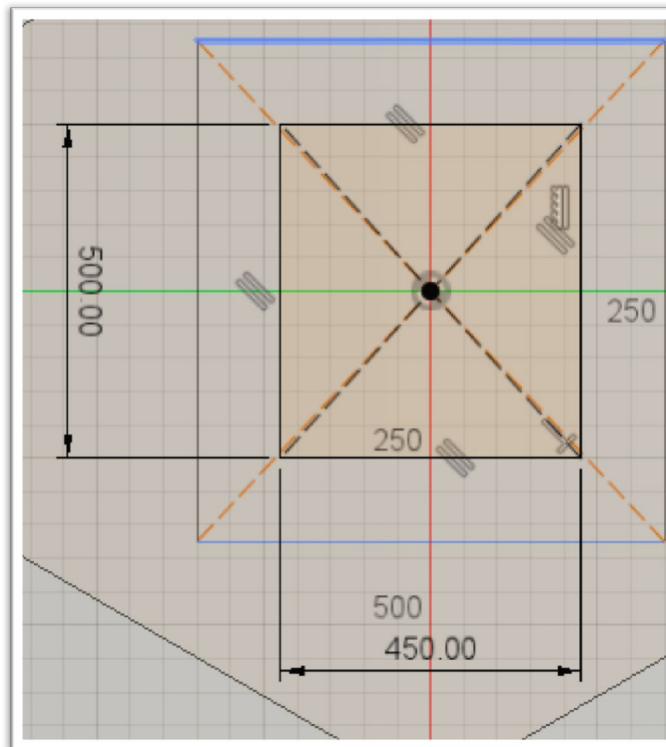
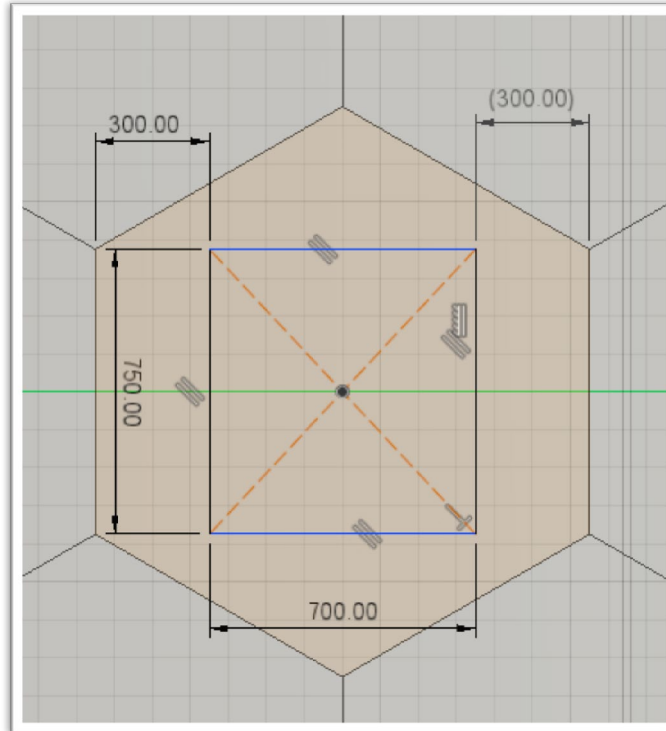
Resources (Sketches) Step 1



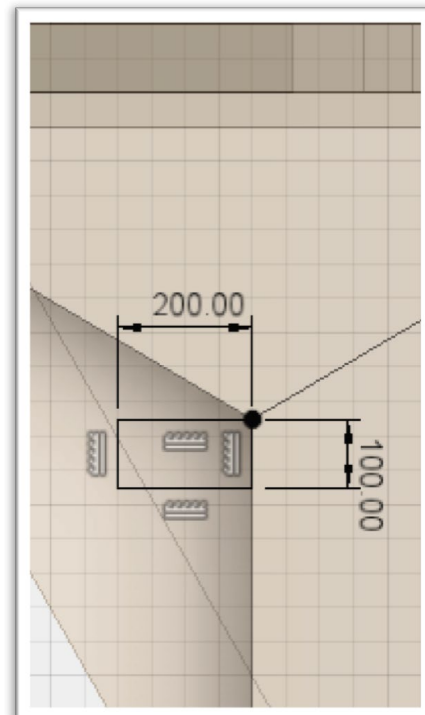
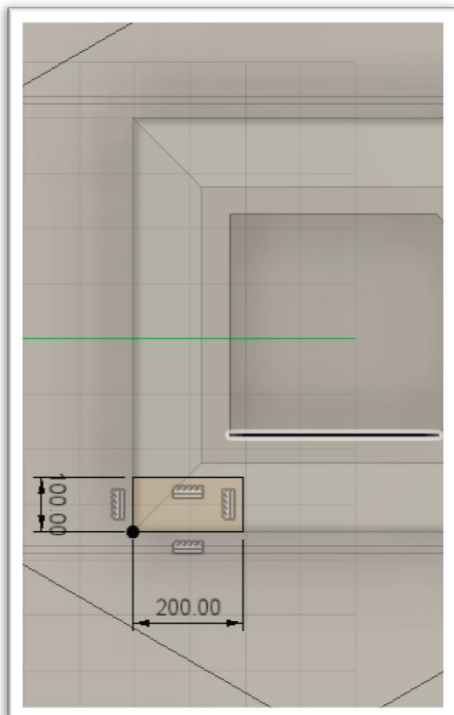
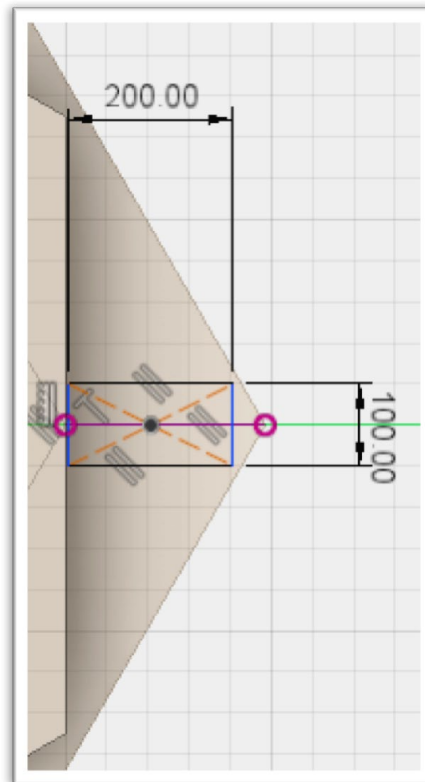
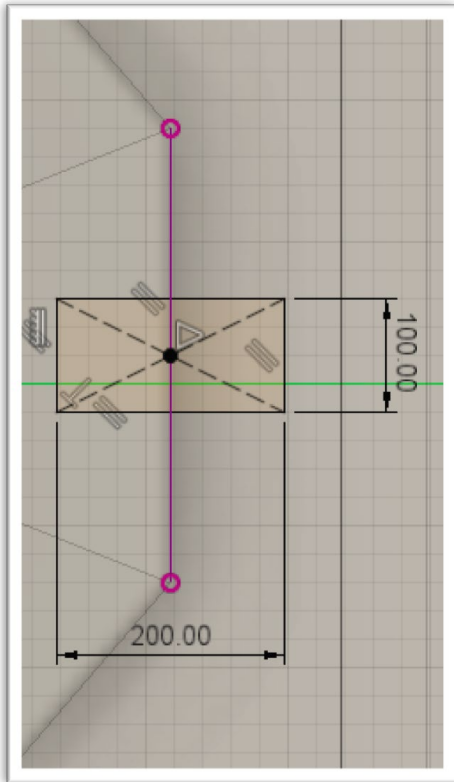
Resources (Sketches) Step 3



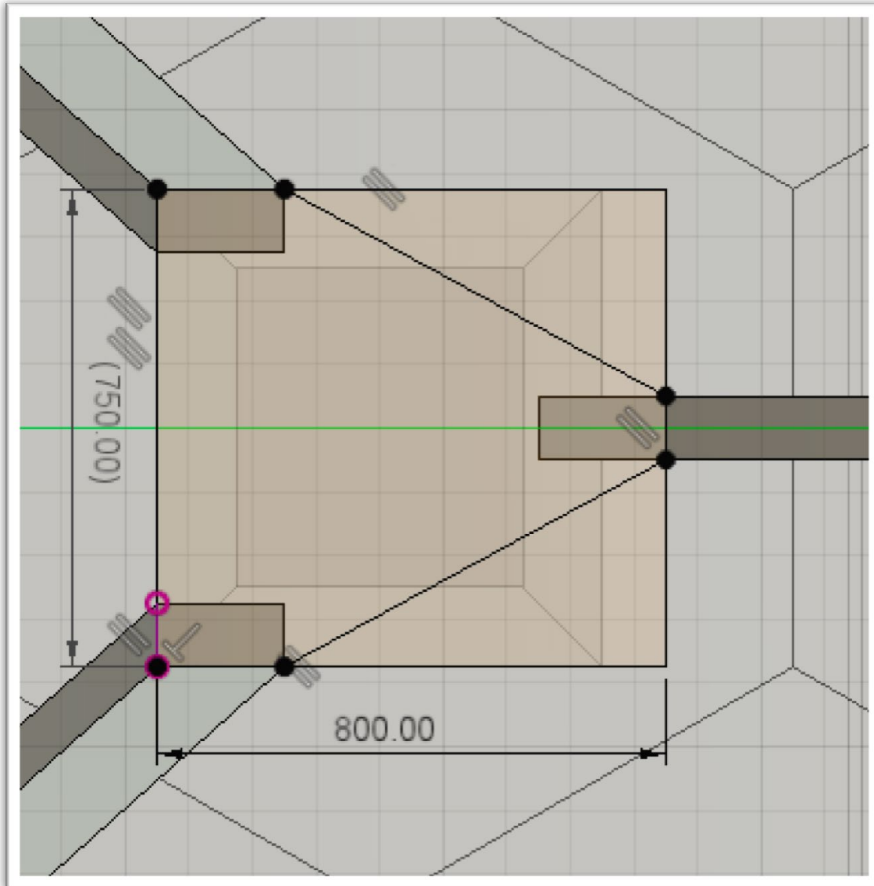
Resources (Sketches) Step 5



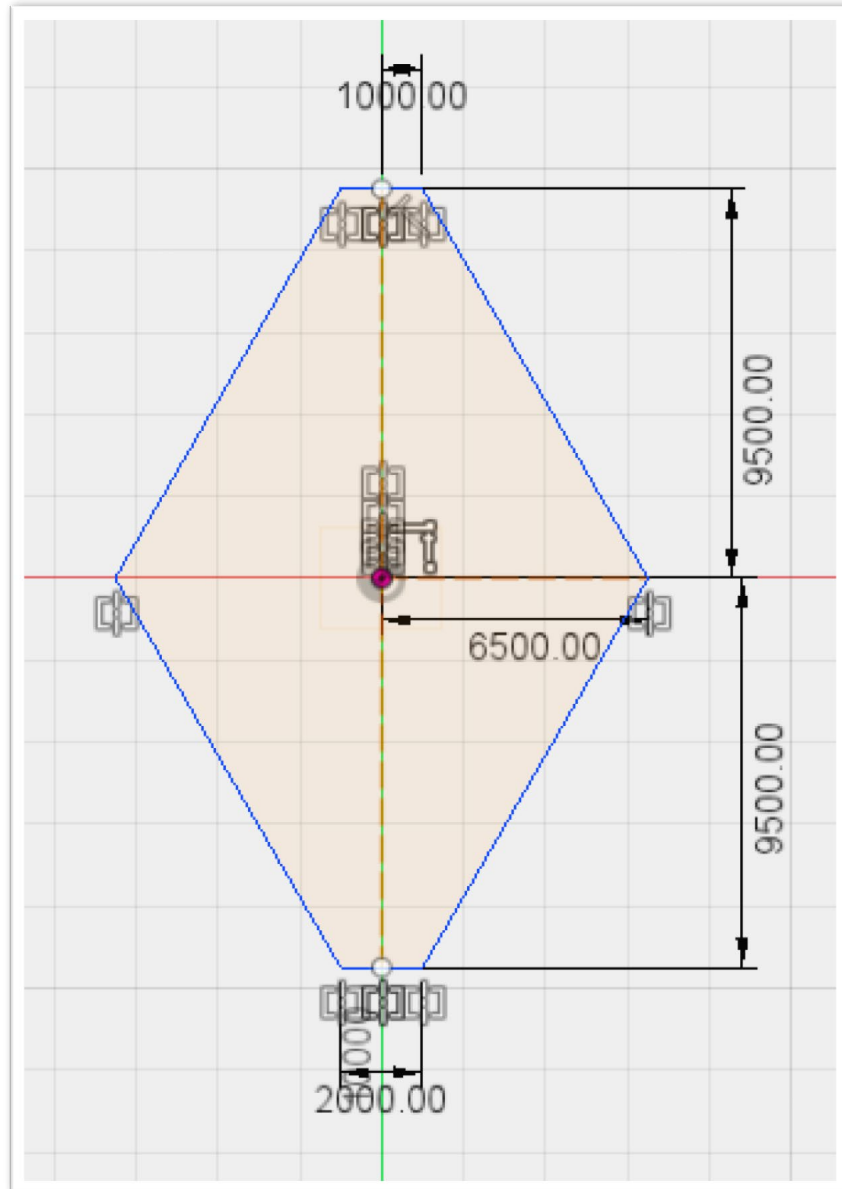
Resources (Sketches) Step 5



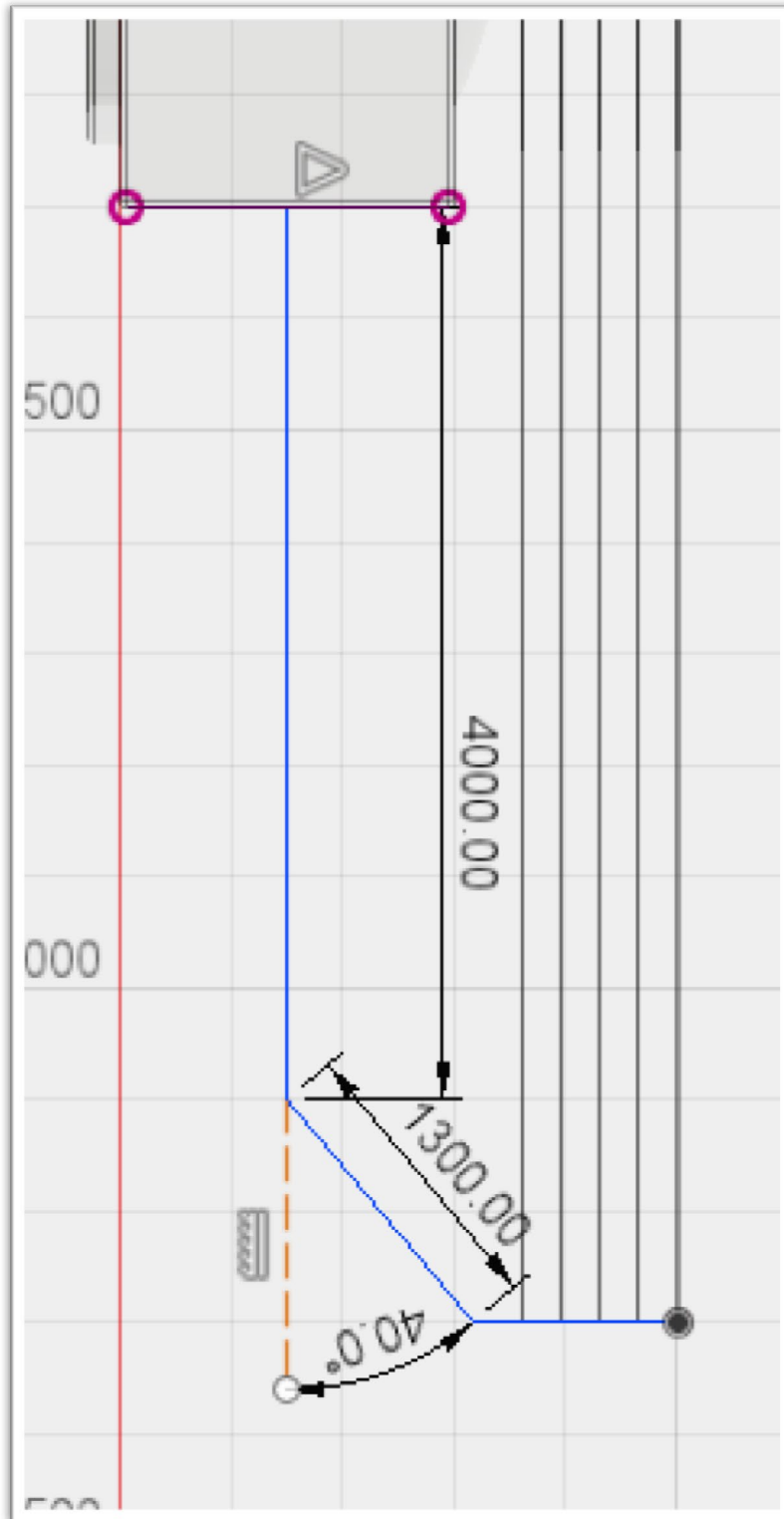
Resources (Sketches) Step 5



Resources (Sketches) Step 6



Resources (Sketches) Step 7



Resources (Sketches) Step 7

