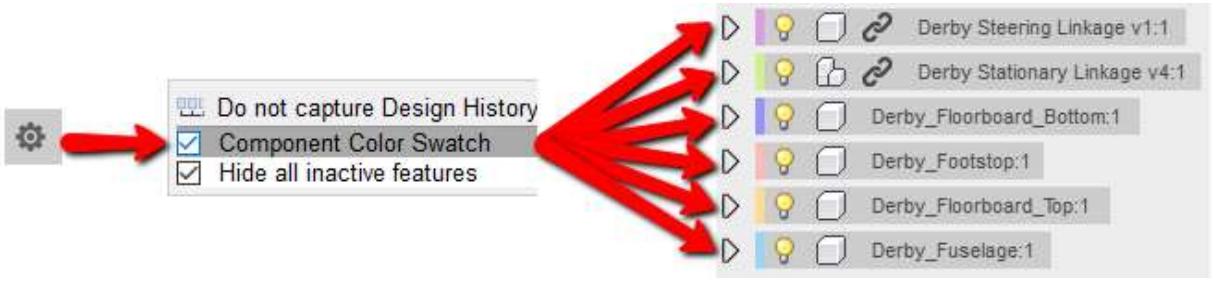
Apply Joints

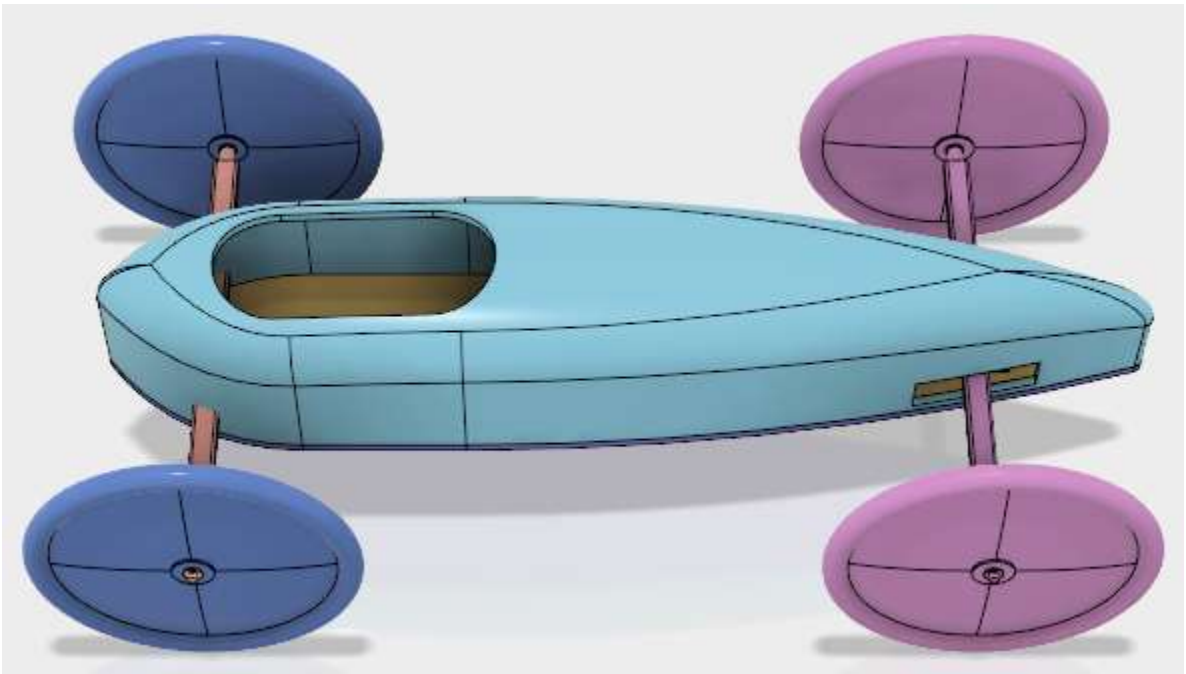
Exercise One: Identifying Components

1. Turn on Component Color Swatch, in the Settings, located in the lower right corner of Fusion 360



1. Toggle on Component Color Cycling under the Inspect panel (Can use Shift+N)

This will make the components display in different colors on the design. Notice the front steering is one component, while the stationary linkage is separate components.



Apply Joints

Exercise One: Identifying Components

3. Select and isolate the steering and stationary linkage, to see the difference in the two linked designs.

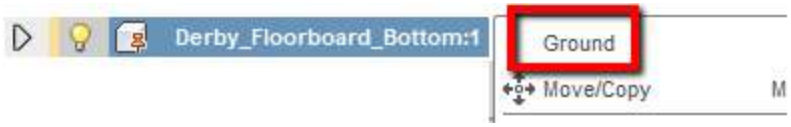
4. Expand the two linked designs in the browser to look at the components or bodies.

5. Right click in the design window and unisolate all.
6. Toggle off Component Color Swatches, using a Shift+N.

Apply Joints

Exercise Two: Ground base component

1. Ground the linked Derby Floorboard Bottom, to prevent it from moving in the design.



2. Select both Derby Floorboard Bottom and Derby Floorboard Top in the Browser

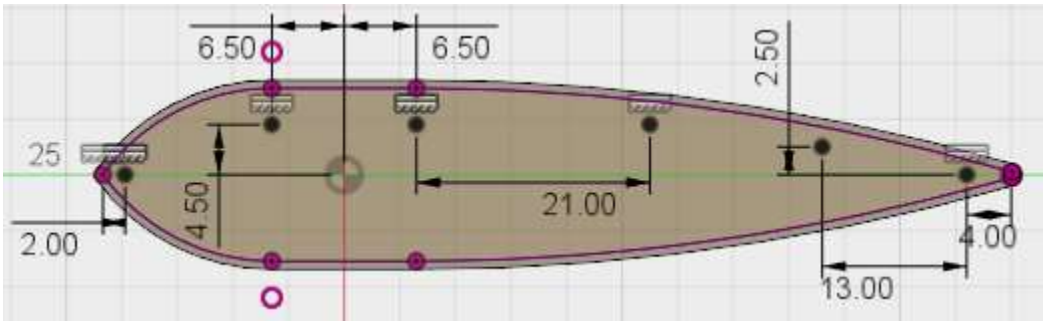
3. Right click and isolate.
4. This should turn off the visibility of Derby Fuselage, Derby Stationary Linkage and Derby Steering Linkage.

Apply Joints

Exercise Three: Creating a mirror sketch pattern

This should turn off the visibility of everything except the Derby Fuselage, Derby Stationary Linkage and Derby Steering Linkage.

1. Create a sketch on the top of Derby Floorboard Top.
2. Create the following points for hole locations

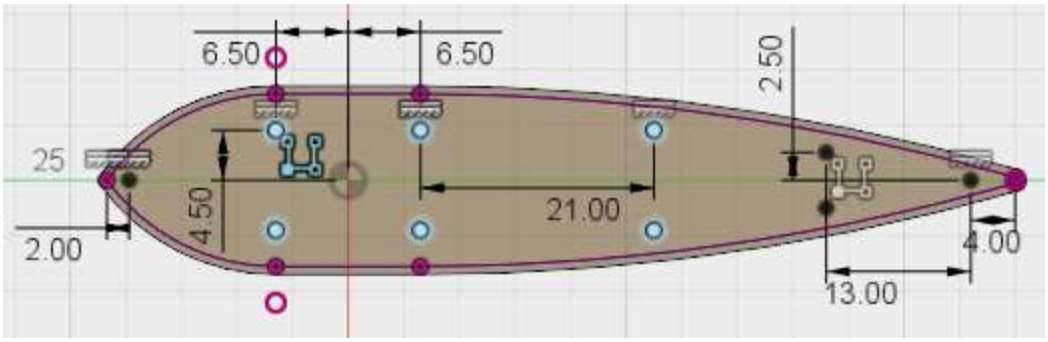


3. Project the Z axis

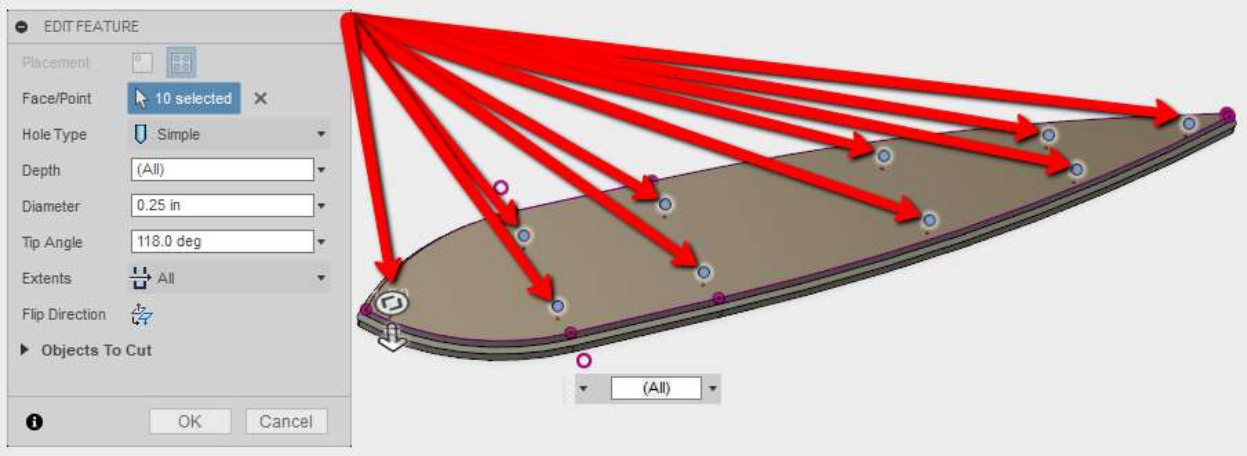
Apply Joints

Exercise Three: Creating a mirror sketch pattern

4. Mirror the points using the Z axis for the mirror line



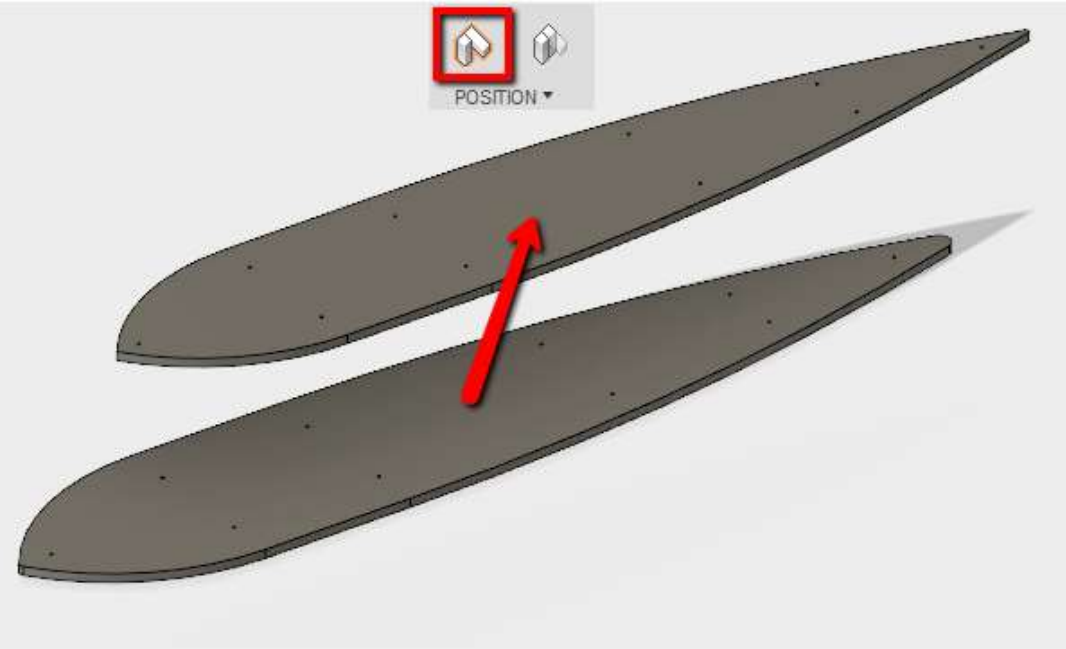
5. Create a simple .25 inch through hole at the 10 point locations located on the sketch.



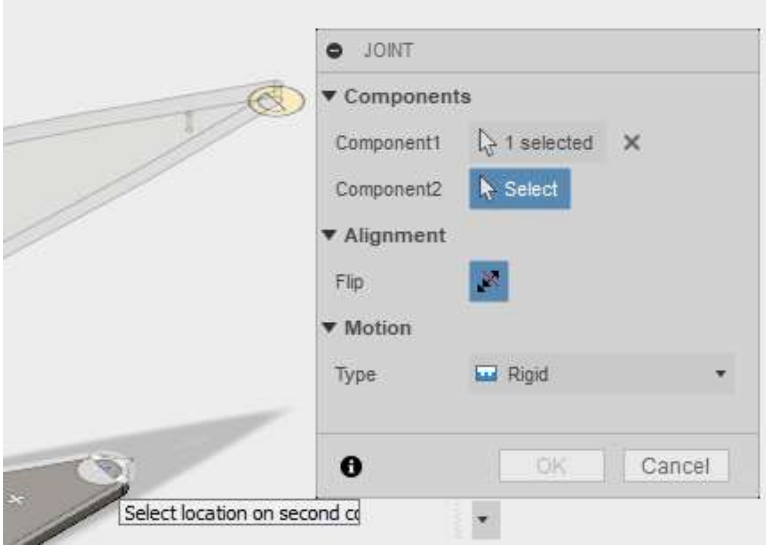
Apply Joints

Exercise Four: Constraining the floorboards

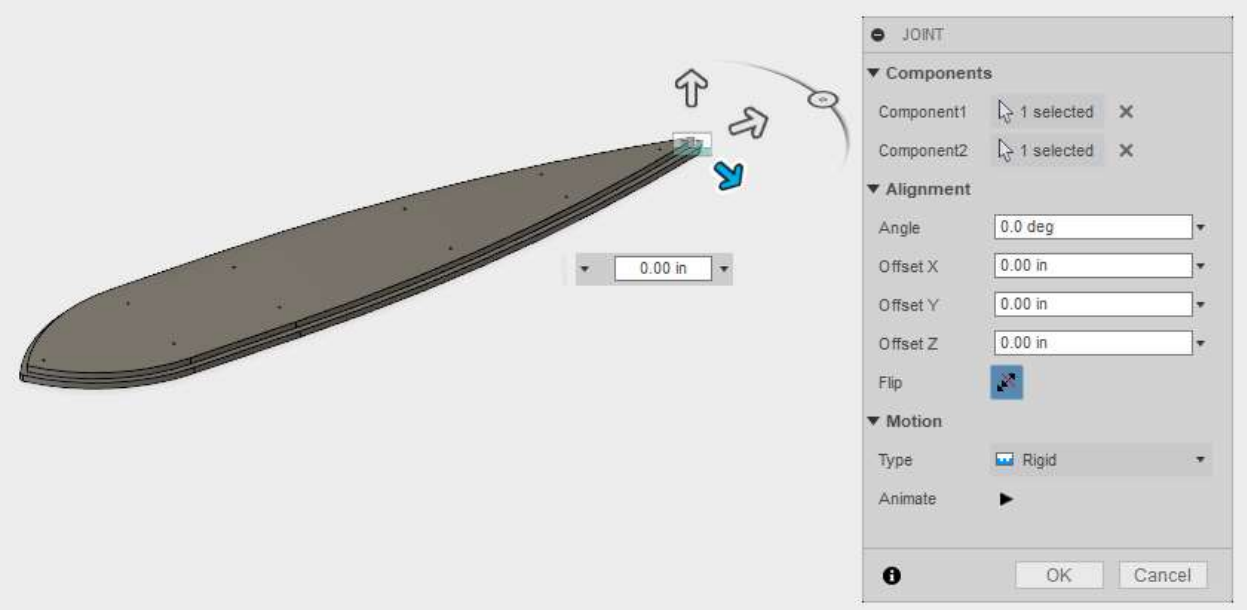
1. Go to the home view
2. Select the Floorboard Top and drag it to the upper left.
3. Capture the move in the history



4. Select the bottom center of the floorboard top and the top center of the arc on the floorboard bottom
5. Apply a rigid constraint since the two boards are glued together.



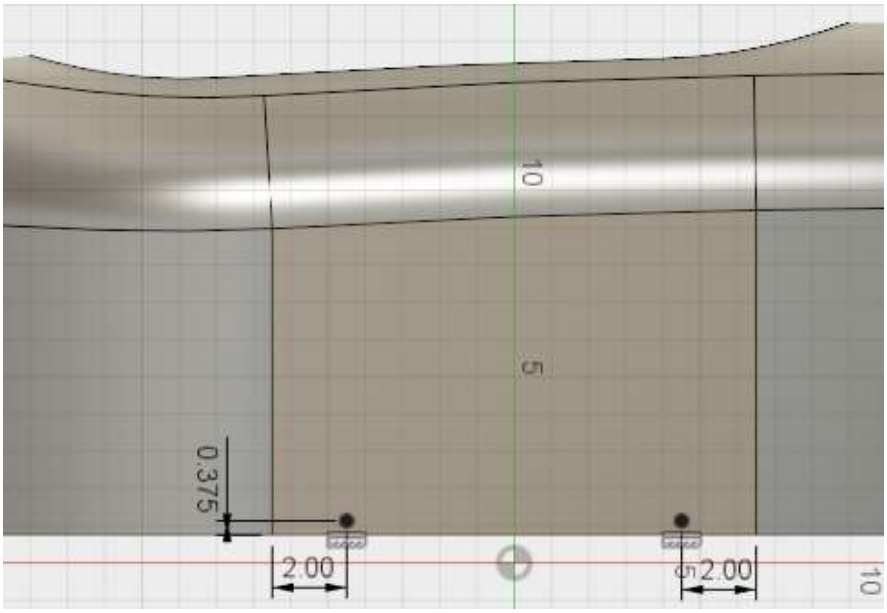
6. Go to the home view
7. Select the Floorboard Top and drag it to the upper left.



Apply Joints

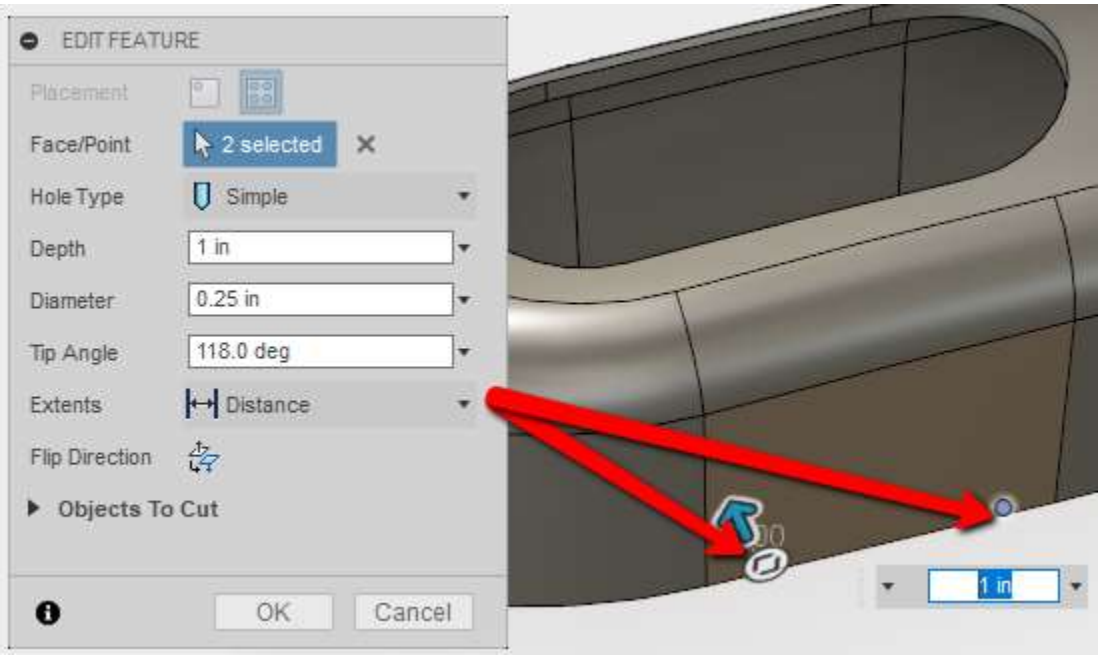
Exercise Five: Creating mounting holes for the fuselage

1. Right click in the design window and select to undo the isolate
2. Select the Derby Fuselage and Derby Floorboard Top and do an isolate
3. Create the following sketch on one of the two flat surfaces of the fuselage

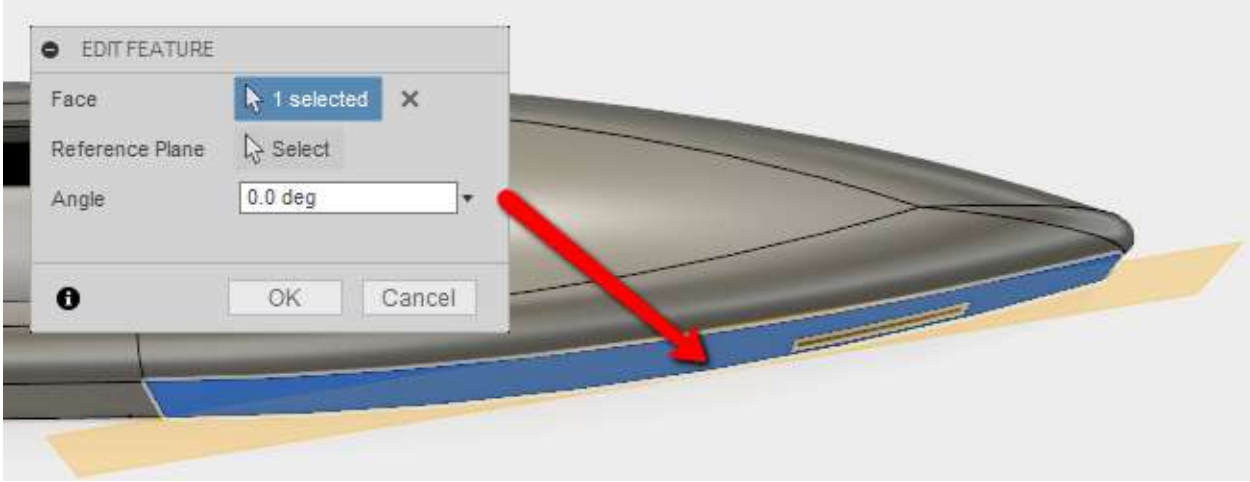


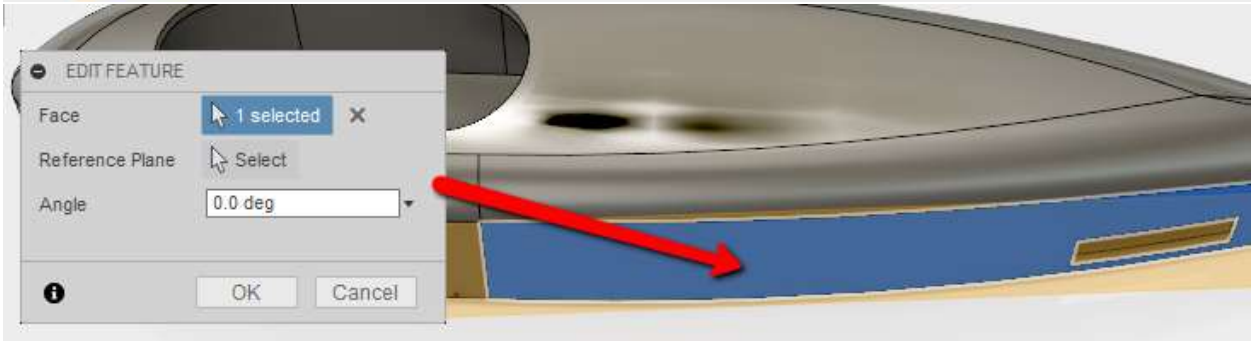
4. Create .25 inch holes at both points that go 1 inch into both components

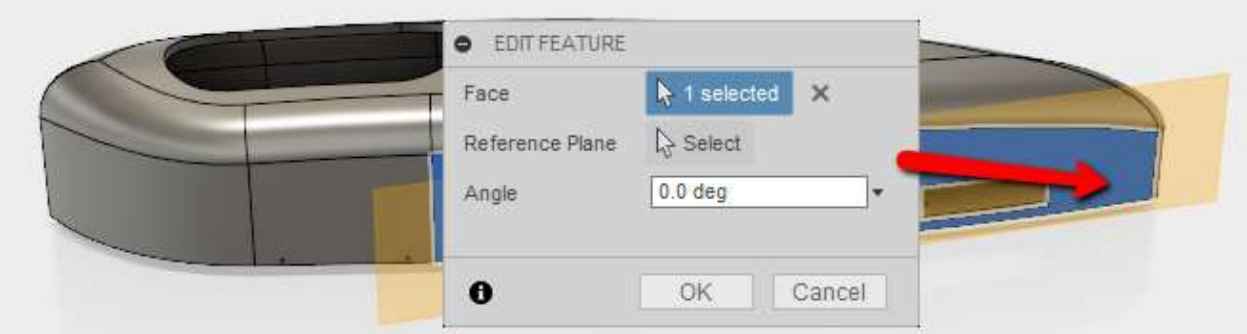
Note: Exercise Sheet has more holes to create on the tangent surfaces of the fuselage.

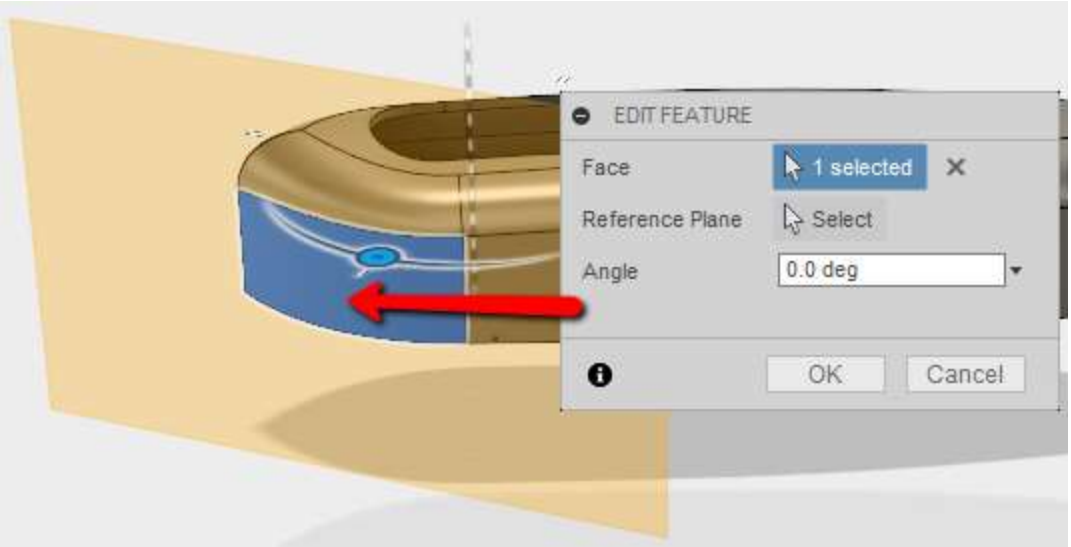


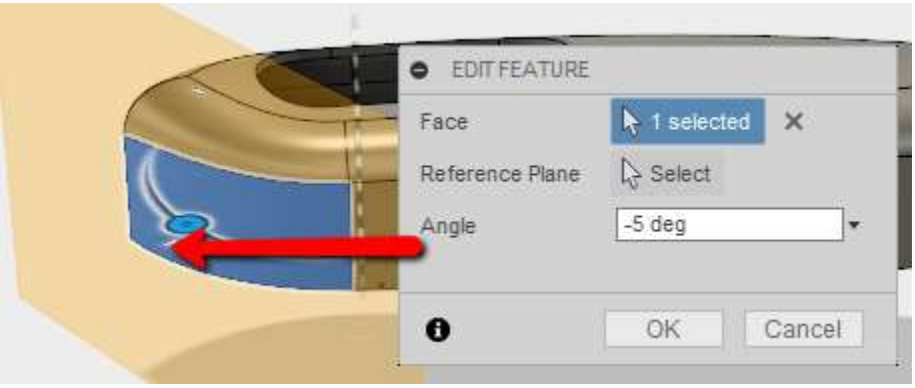
A. For additional holes, create tangent planes at the locations in the following images.



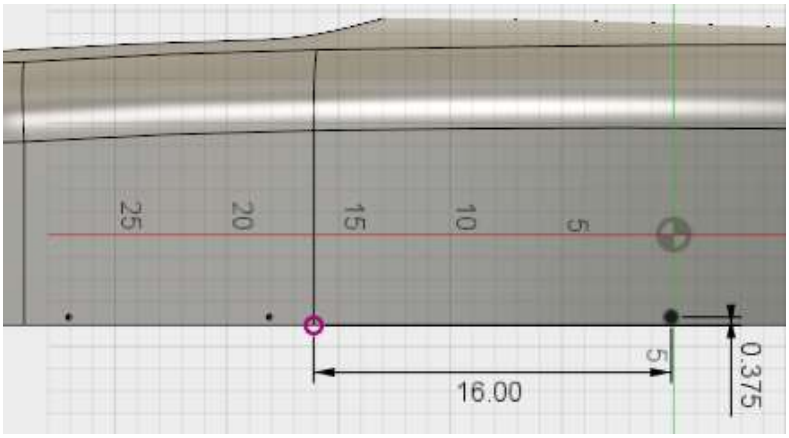


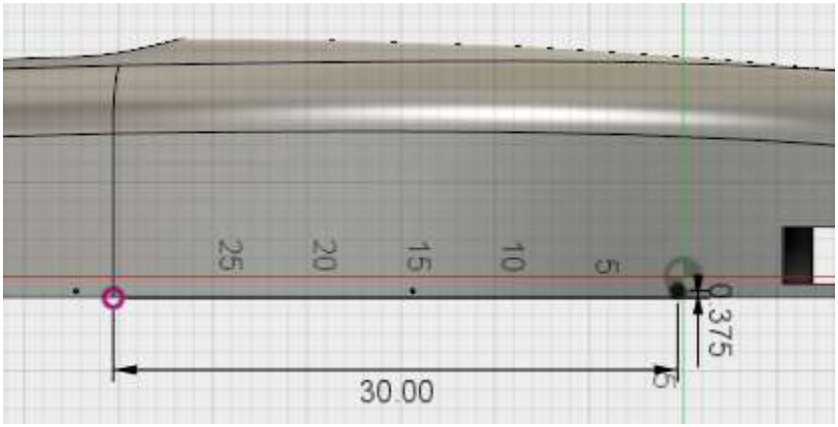

EDIT FEATURE
Face
1 selected
Reference Plane
Select
Angle
0.0 deg
OK
Cancel

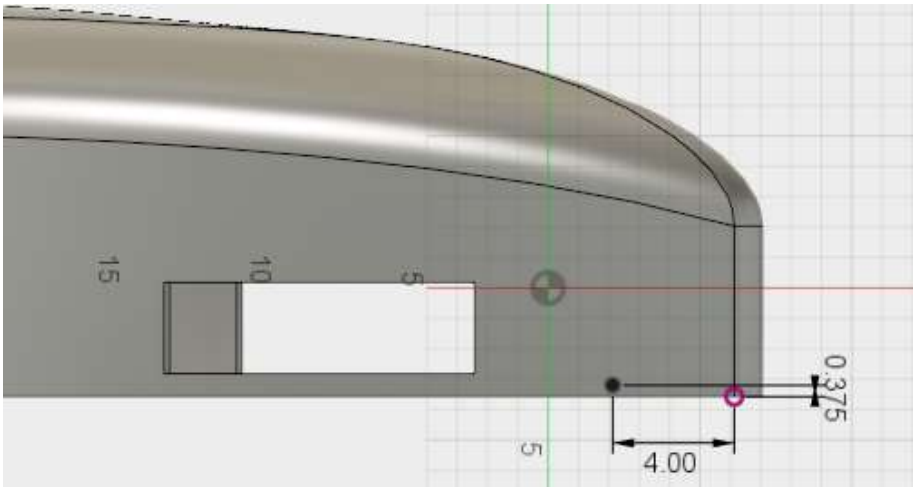

EDIT FEATURE
Face
1 selected
Reference Plane
Select
Angle
0.0 deg
OK
Cancel

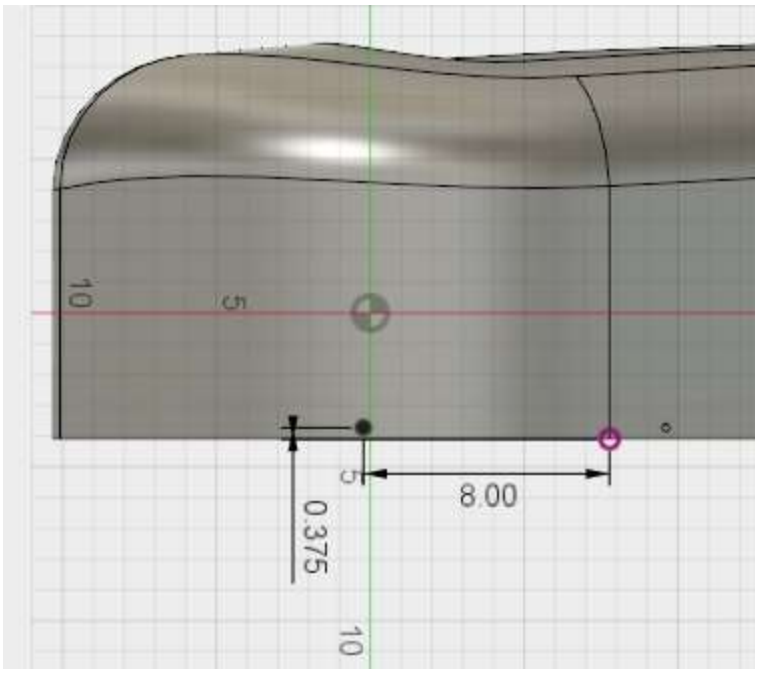

EDIT FEATURE
Face
1 selected
Reference Plane
Select
Angle
-5 deg
OK
Cancel

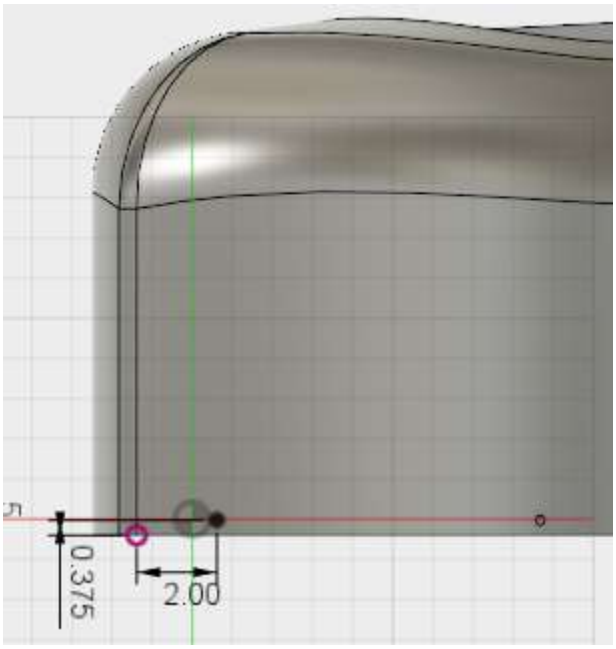
B. Create a sketch with the following dimensions



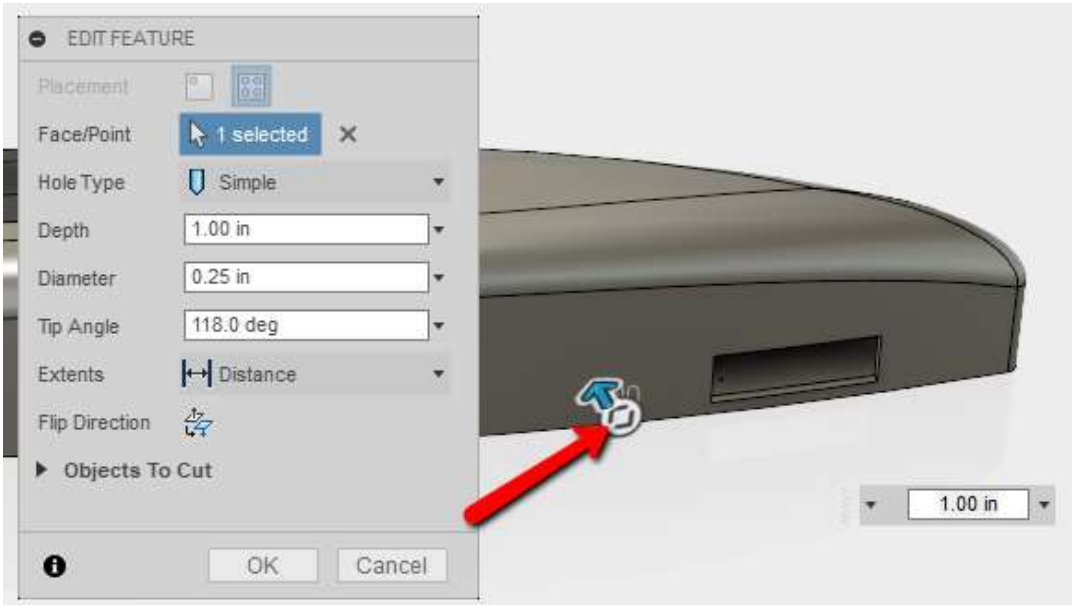


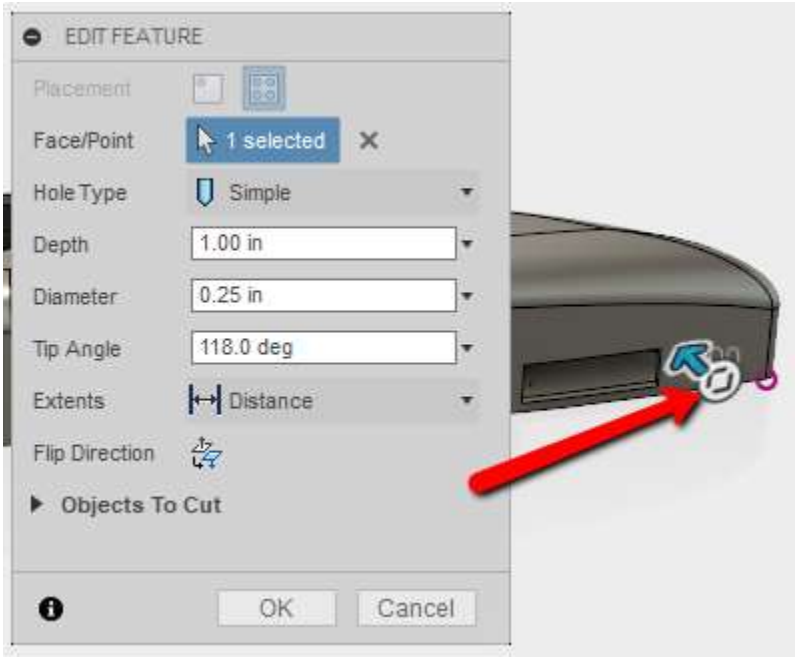


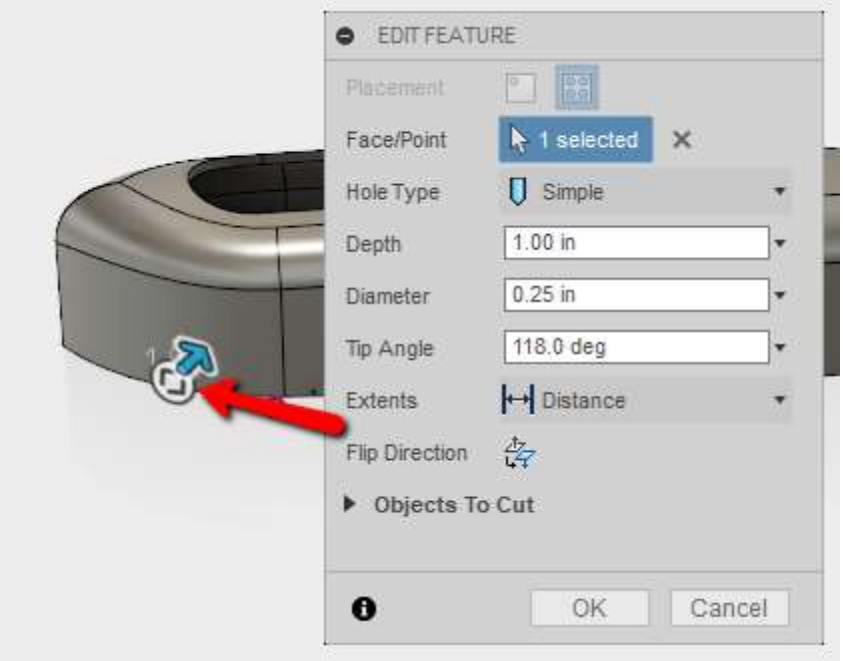

10
5
5
8.00
0.375
10

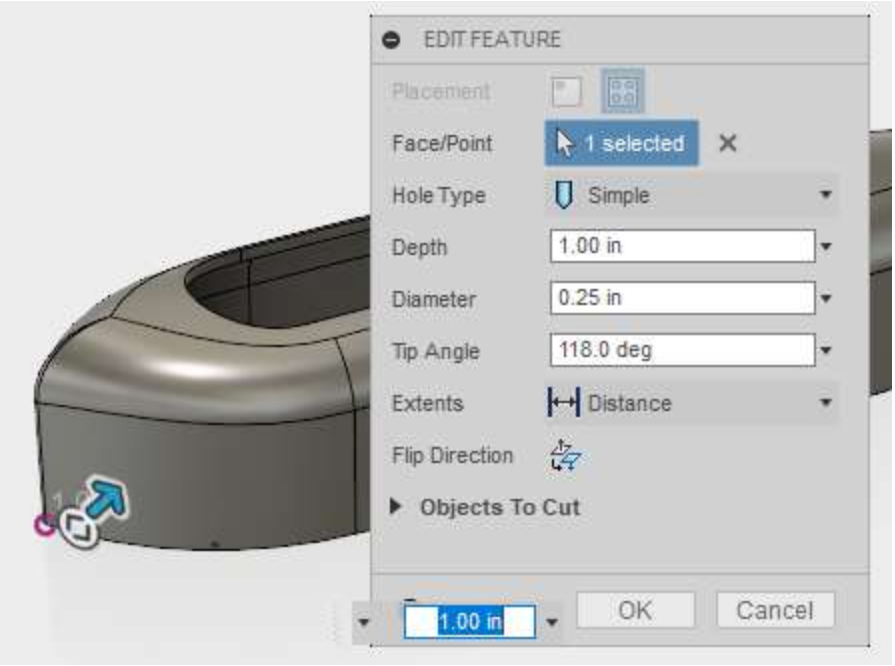

0.375
2.00

Create .25 inch holes that are 1 inch deep/





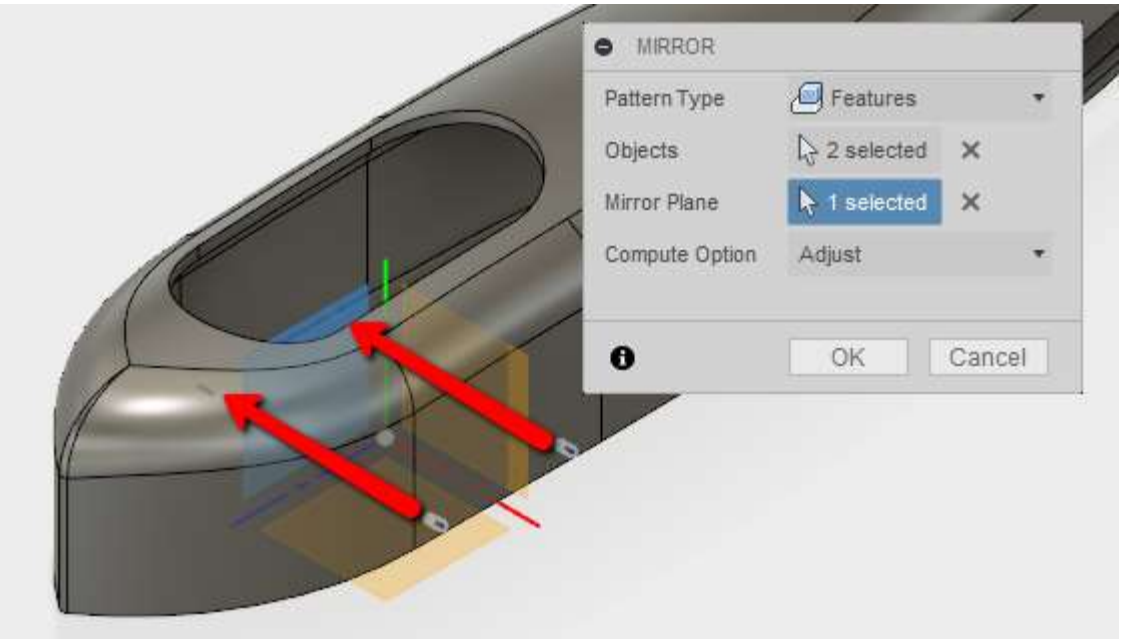

EDIT FEATURE
Placement
Face/Point
1 selected
Hole Type
Simple
Depth
1.00 in
Diameter
0.25 in
Tip Angle
118.0 deg
Extents
Distance
Flip Direction
Objects To Cut
OK
Cancel


EDIT FEATURE
Placement
Face/Point
1 selected
Hole Type
Simple
Depth
1.00 in
Diameter
0.25 in
Tip Angle
118.0 deg
Extents
Distance
Flip Direction
Objects To Cut
1.00 in
OK
Cancel

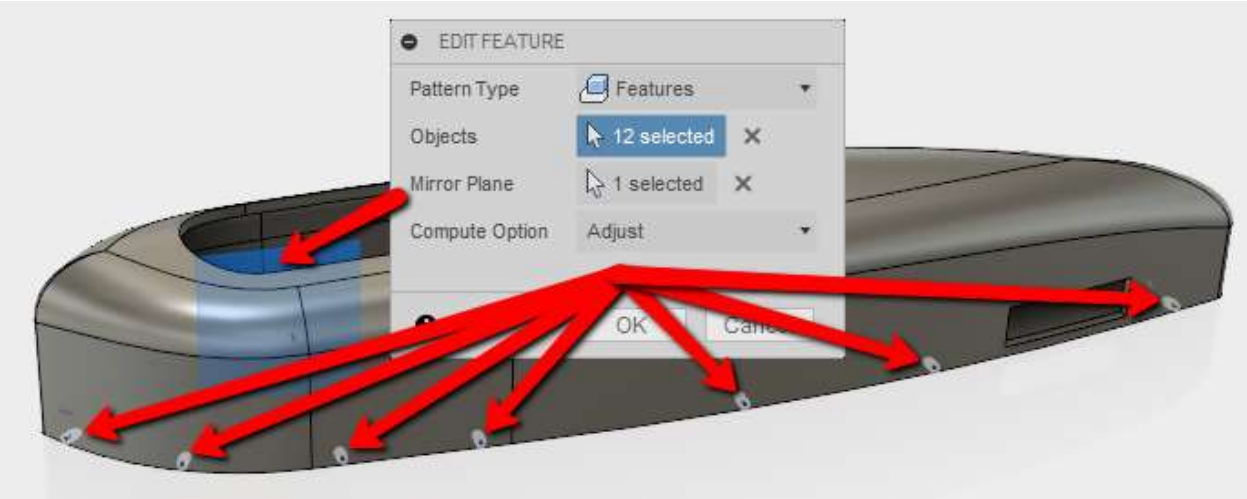
Apply Joints

Exercise Six: Mirror hole features to other side

1. Mirror the hole features to the other side using the YZ plane.



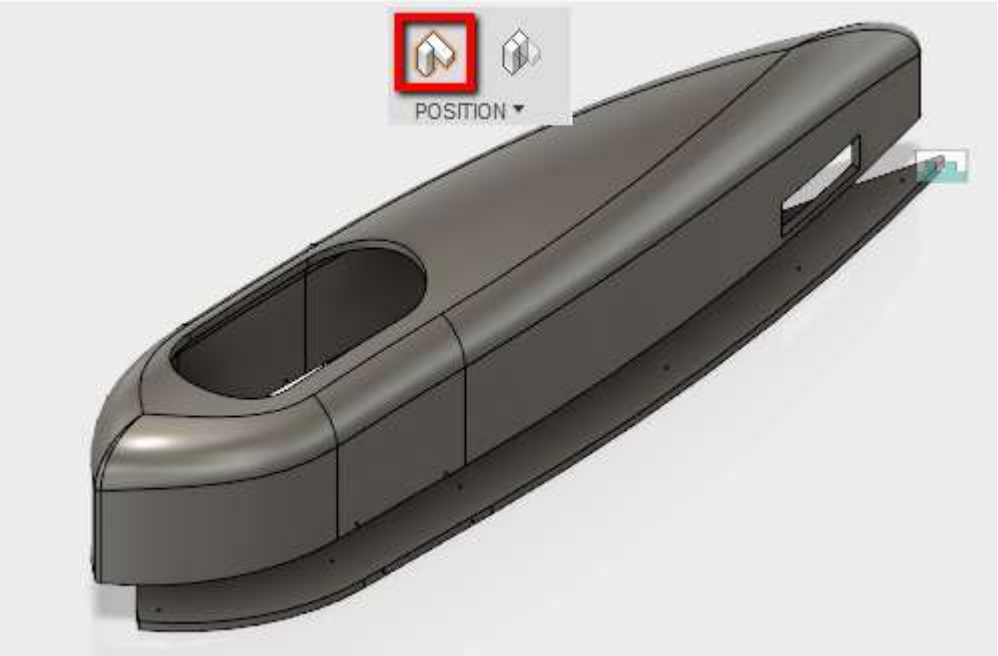
Note: Mirror all holes if extra steps were done.



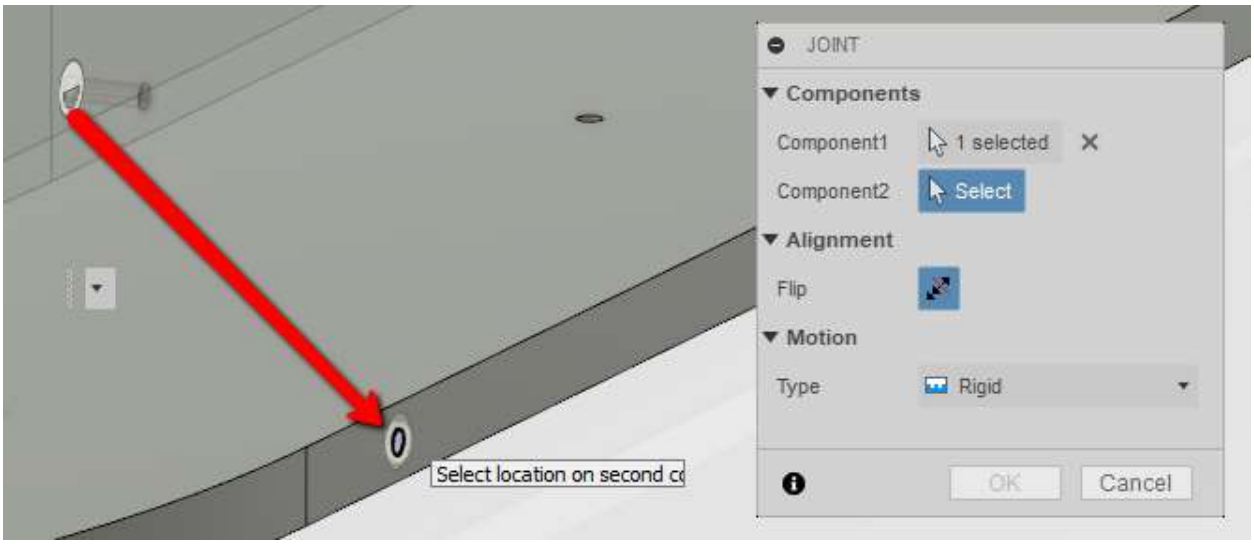
Apply Joints

Exercise Seven: Constraint mounting holes for fuselage

1. Pick and drag the fuselage.
2. Capture the movement.



3. Constraint the hole for the Derby Fuselage and Derby Floorboard Top with a Rigid Constraint to keep it in place.

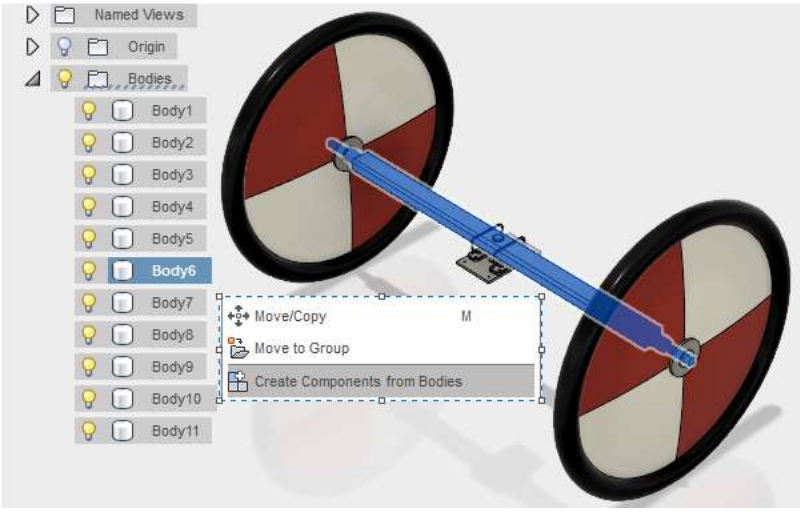


Sub-Assemblies

Exercise Eight: Using Sub-Assemblies

1. Right Click on Derby Steering Linkage and Copy the design
2. Rename the design Derby Steering Linkage Edit

3. Open the new design and right click on the body for the shaft.
4. Select Create Component from Bodies

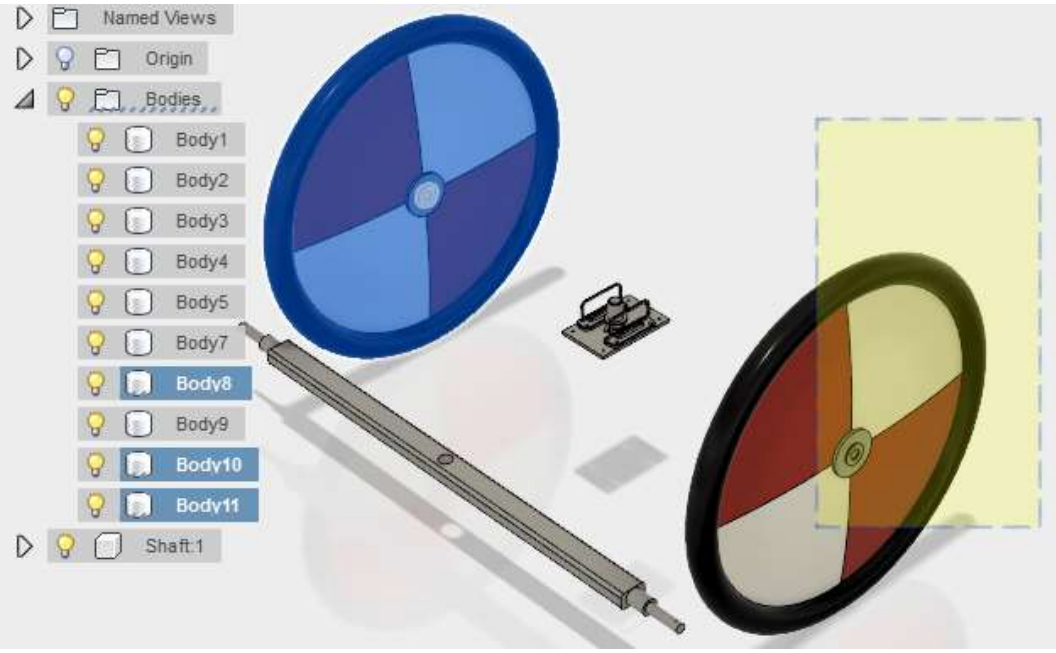


This will create a new component

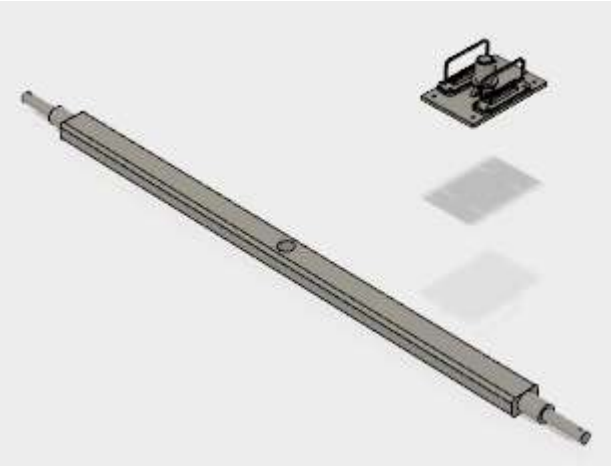
5. Rename the new component Shaft.

Sub-Assemblies

Exercise Eight: Using Sub-Assemblies



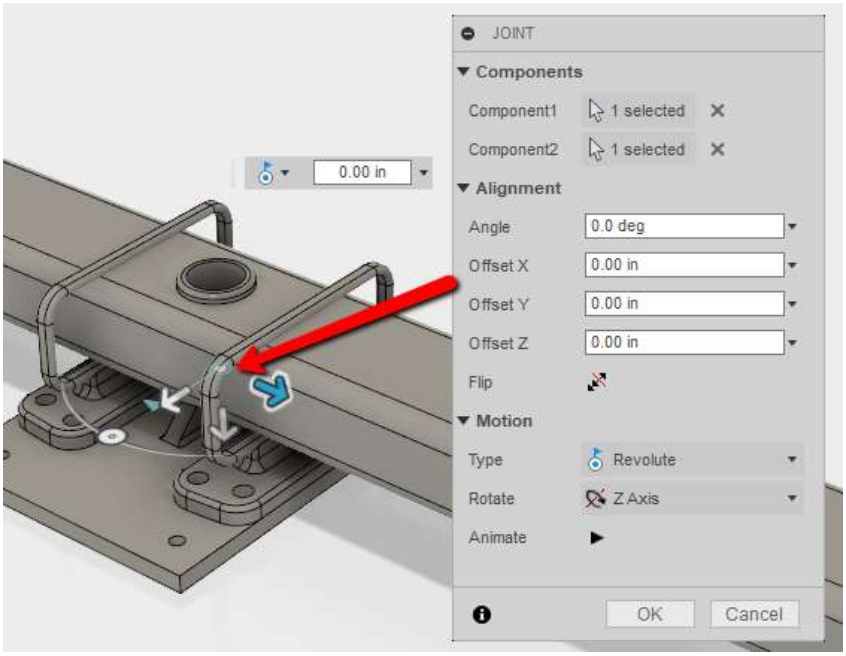
6. Select the wheel and washer bodies and delete them



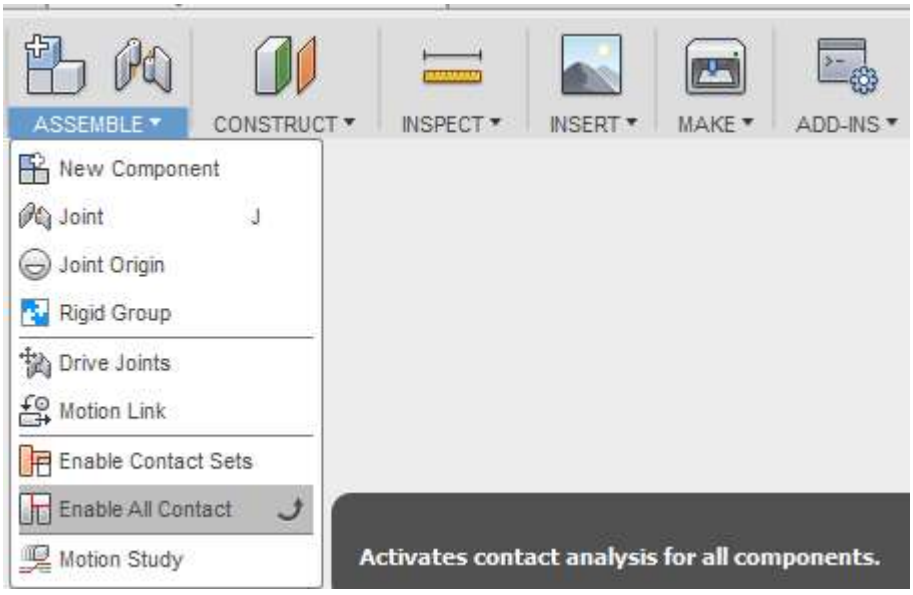
Sub-Assemblies

Exercise Eight: Using Sub-Assemblies

7. Place a Revolute joint on the top of the washer and the bottom of the Shaft.



8. Enable All Contact.
9. Pick and drag the shaft.



The shaft is limited on its movement.

Sub-Assemblies

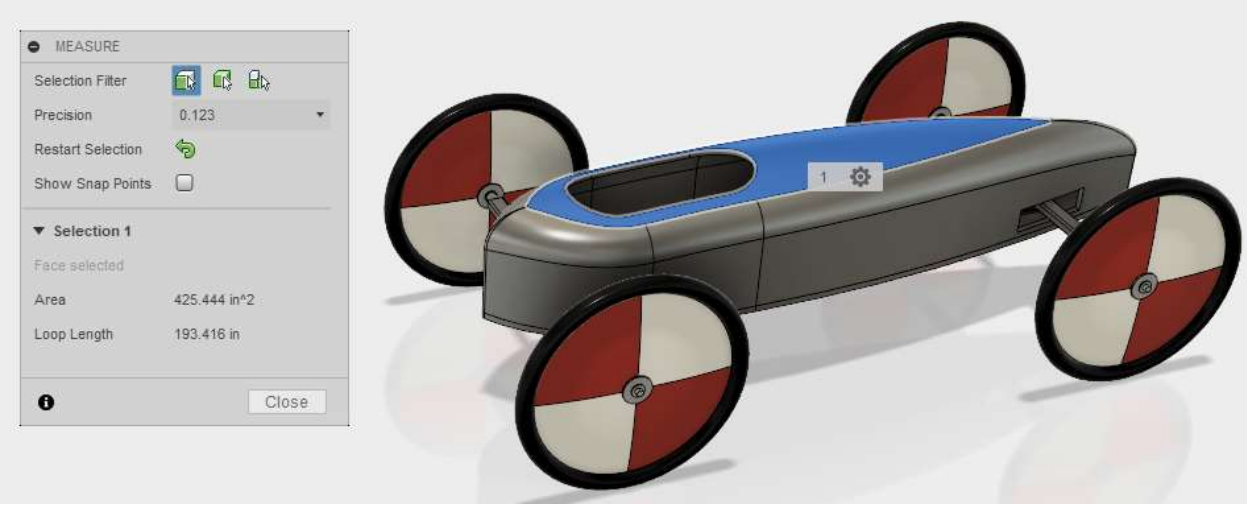
Exercise Eight: Using Sub-Assemblies

10. Save and close the file.

Inspect

Exercise Nine: Inspect surfaces, bodies, components

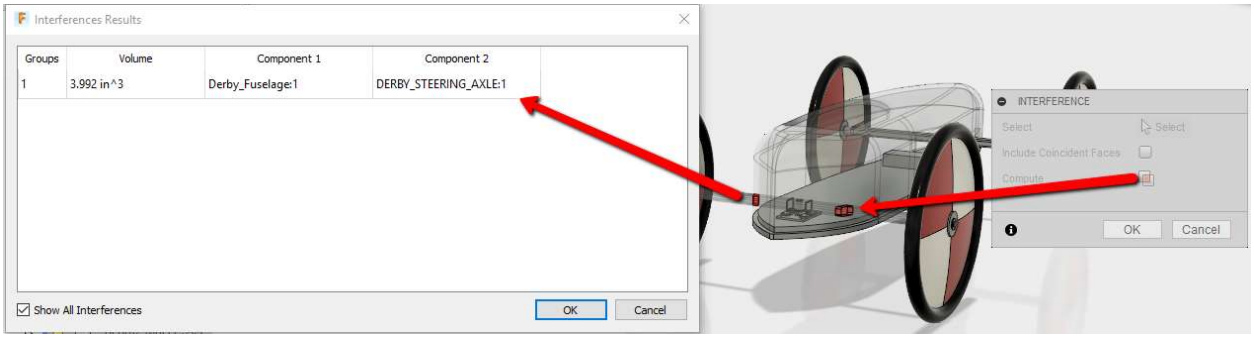
1. Measure the distance between shafts using faces
2. Measure the distance between the bodies of the steering linkage wheels
3. Measure the distance between the components of the stationary linkage wheels
4. Measure the surface of the top of the fuselage



Sub-Assemblies

Other ways to inspect your designs:

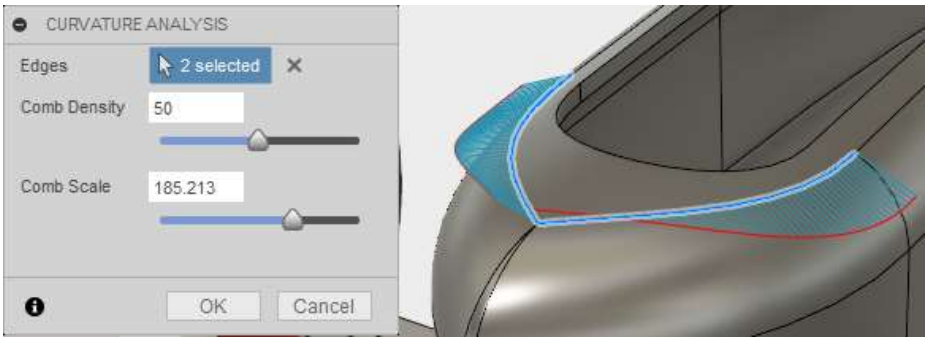
Interference will let you know if components are sharing the same space.



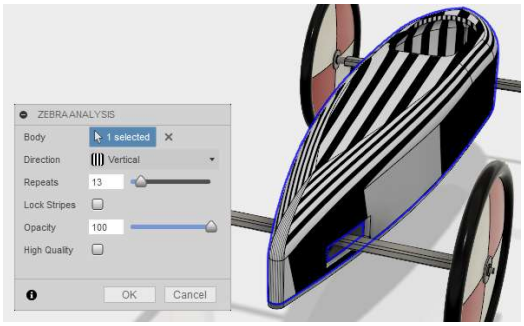
Inspect

Other ways to inspect your designs:

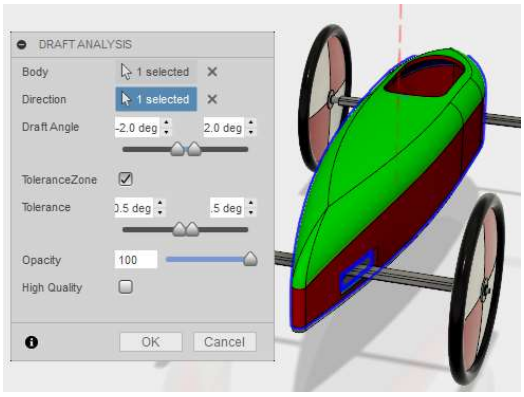
Curvature Comb can analyze the tangencies of a curved edge.



Zebra analysis will analyze the smoothness going between surfaces, to pinpoint creases or other defects.



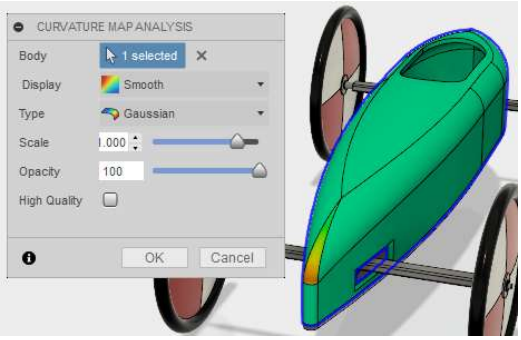
Draft analysis shows angle draft from a specified direction.



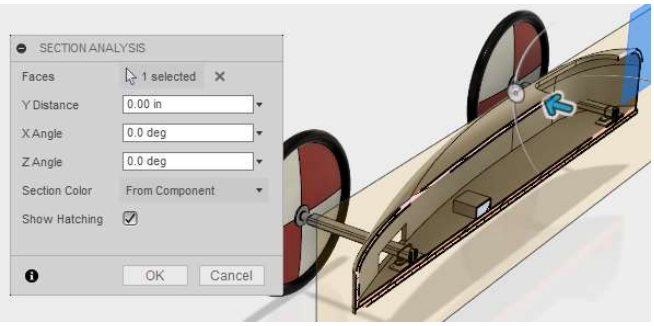
Inspect

Other ways to inspect your designs:

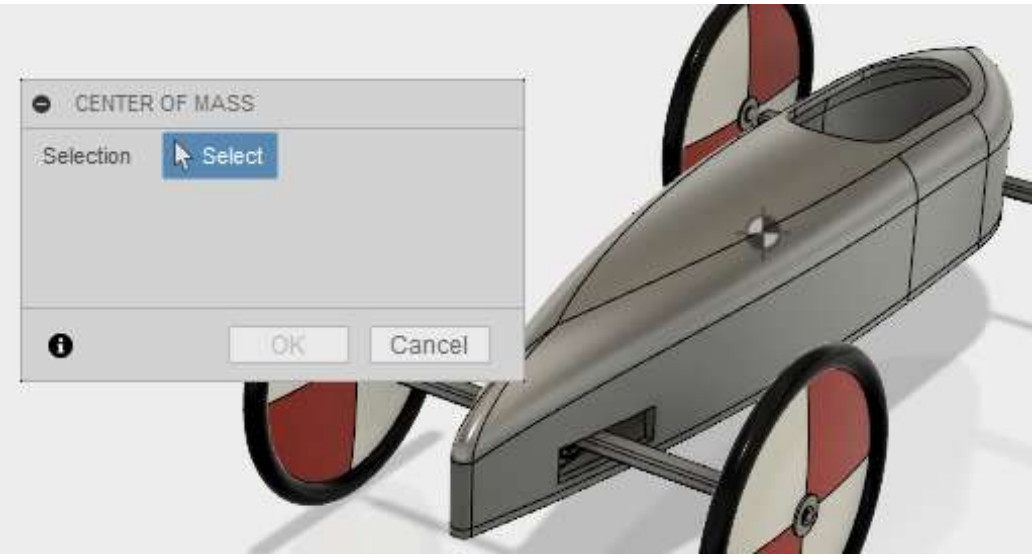
Curvature map analysis Sharp curves are displayed hot will gradual curves are cooler.



Section analysis displays the Design with a section cut you specify



Center of mass displays on the object selected.



Inspect

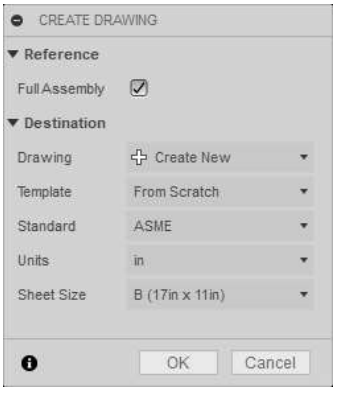
Exercise Twelve: Inspect surfaces, bodies, components

1. Do an interference between the Fuselage and the Stationary Linkage shaft.
2. Do a Curvature Comb analysis of the back edge of the cockpit opening.
3. Do a Zebra analysis of the fuselage.
4. Do a draft analysis with the top face of the Floorboard Top as the draft direction.
5. Do a Curvature analysis of the fuselage.
6. Do a section analysis using the YZ plane for sectional reference

Drawing and Annotation

Exercise Nine: Create a drawing from a design

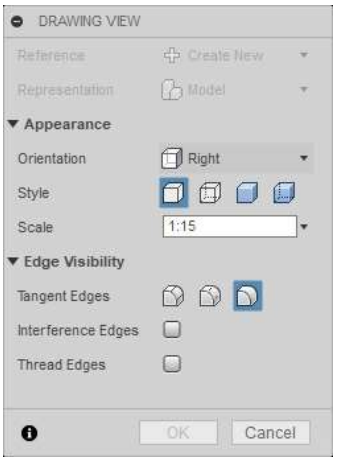
1. Right click on Derby Assembly and select Create drawing
2. Take the defaults in the Create Drawing dialog box



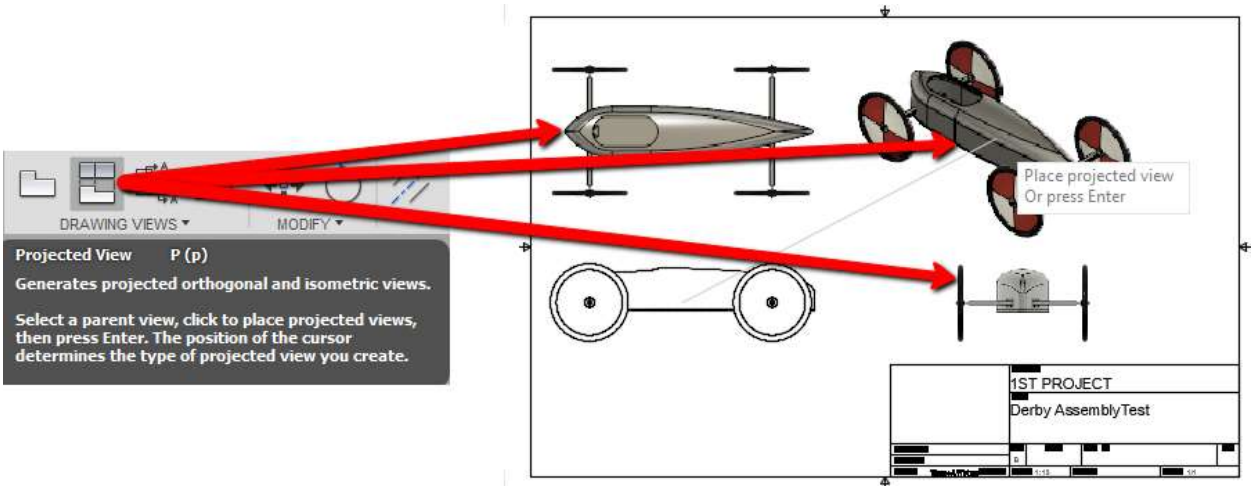
Drawing and Annotation

Exercise Nine: Create a drawing from a design

3. Use the Right orientation
4. Set to 1:15 Scale



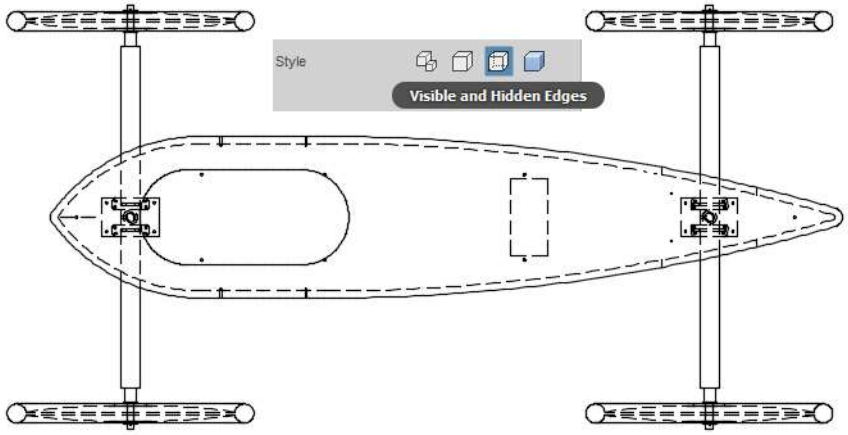
5. Select from the Drawing View panel or right click on the base view and select Create Perspective View.



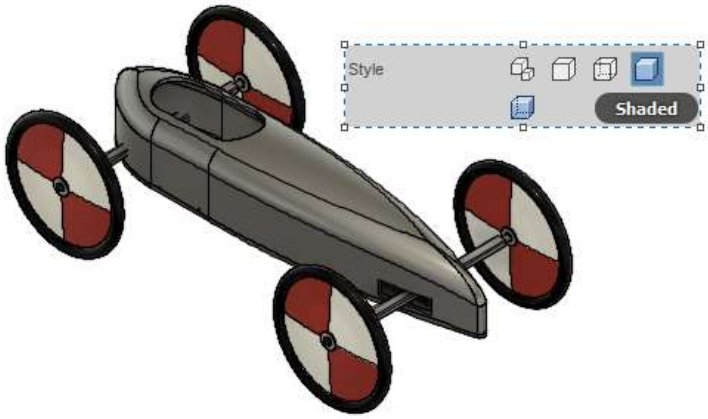
Drawing and Annotation

Exercise Nine: Create a drawing from a design

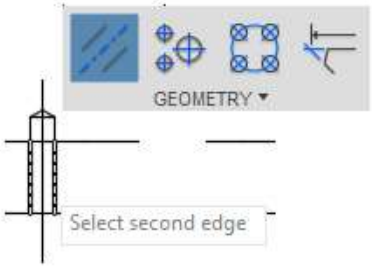
6. Right click the top view to edit the view
7. Change to wireframe with hidden edges.

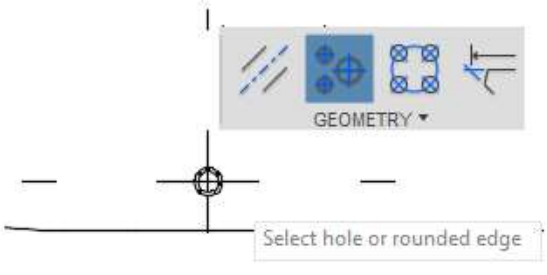


8. Right click the perspective view to edit the view
9. Change to shade with visible edges.



10. Create a centerline by selecting the edges of the diameter of the hole shaft.
11. Create a center line mark for the circular hole.

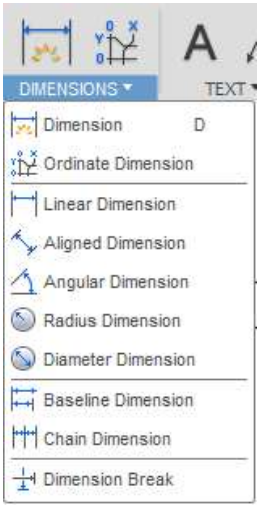


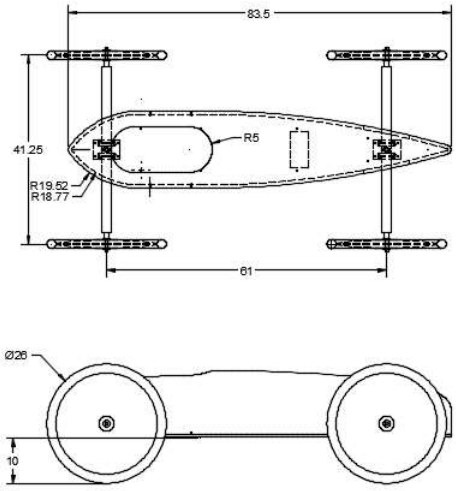


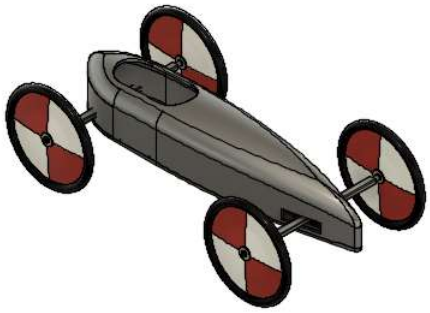
Drawing and Annotation

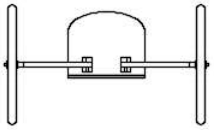
Exercise Nine: Create a drawing from a design

12. Add some linear and radial dimensions to the drawing as shown.





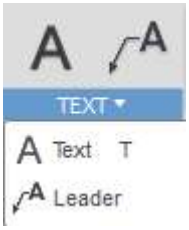


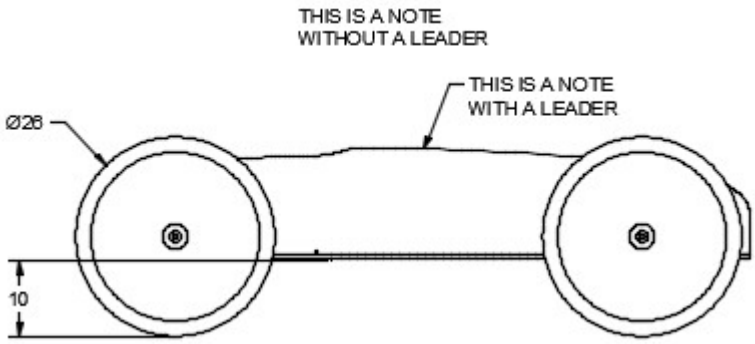


Drawing and Annotation

Exercise Ten: Create Notes

1. Create a note and a note with a leader.





Drawing and Annotation

Exercise Eleven: Tables and Balloons

1. Add a parts list and balloons.