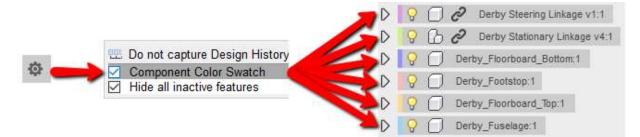
Exercise One: Identifying Components

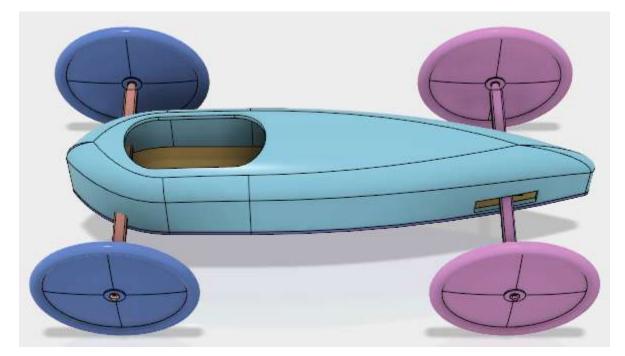
 Turn on Component Color Swatch, in the Settings, located in the lower right corner of Fusion 360



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

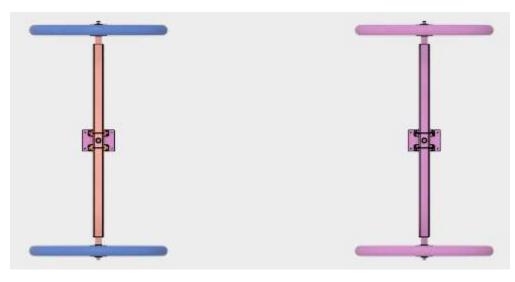


This will make the components display in different colors on the design. Notice the front steering is one component, while the stationary linkage is separate components.



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.

⊿ 💡 🗍 🔗 Derby Steering Linkage v1:1	A 💡 🔓 DERBY STATIOANRY LINKAG
D 🖓 🛅 Origin	🜔 💡 🛅 Origin
⊿ 💡 🗂 Bodies	DERBY_BRACKET:1
💡 🔲 Body1	DERBY_WHEEL v2:1
💡 🔲 Body2	Component1(Mirror):1
💡 🔲 Body3	
💡 🔲 Body4	D DERBY_BASEPLATE_WAL
💡 🔲 Body5	
💡 🔲 Body6	V WASHER_THREE_QTR v1:1
💡 🔲 Body7	Vasher_three_qtr v1:2
💡 🔲 Body8	V WASHER_THREE_QTR v1:3
💡 🔲 Body9	DERBY_WHEEL v2:2
💡 🔲 Body10	Vasher_three_qtr v1:4
💡 🔲 Body11	

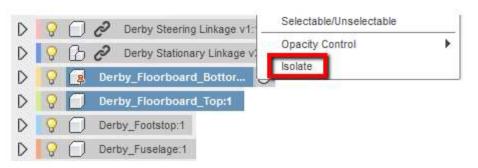
- 5. Right click in the design window and unisolate all.
- 6. Toggle off Component Color Swatches, using a Shift+N.

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



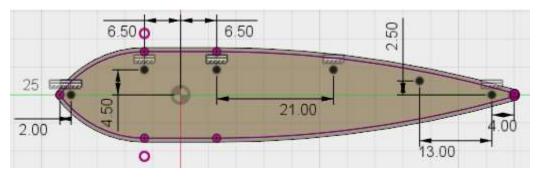
- 3. Right click and isolate.
- 4. This should turn off the visibility of Derby Fuselage, Derby Stationary Linkage and Derby Steering Linkage.

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.

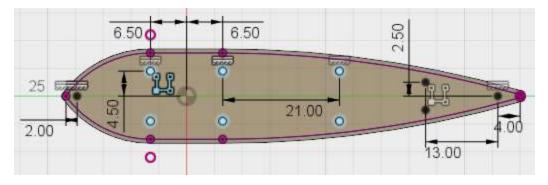
- 1. Create a sketch on the top of Derby Floorboard Top.
- 2. Create the following points for hole locations



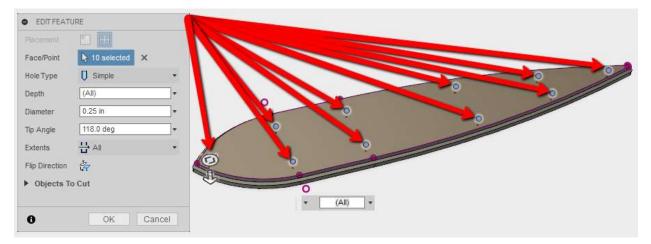
3. Project the Z axis

Exercise Three: Creating a mirror sketch pattern

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

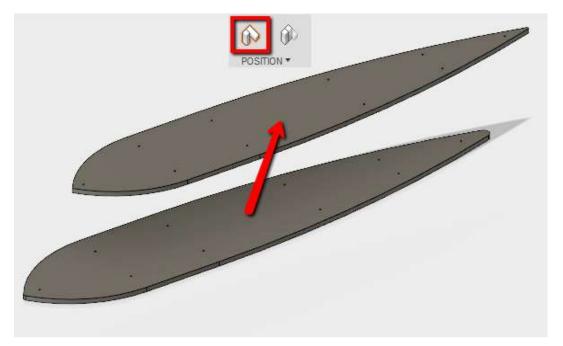


5. Create a simple .25 inch through hole at the 10 point locations located on the sketch.



Exercise Four: Constraining the floorboards

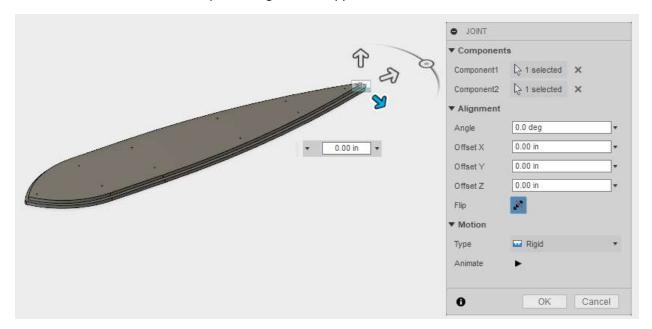
- 1. Go to the home view
- 2. Select the Floorboard Top and drag it to the upper left.
- 3. Capture the move in the history



- 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.

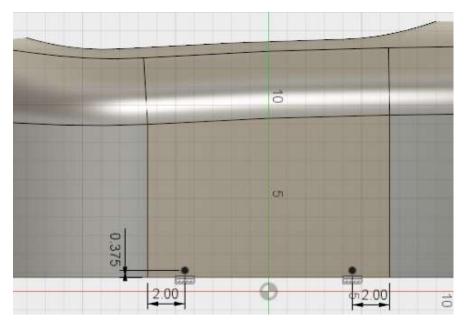
Components Component1 Component2 Component2 Select Alignment Flip Motion Type Rigid Rigid		 JOINT 		
Component2 Select Alignment Flip Motion	Ø	Component	ts	
▼ Alignment Flip ▼ Motion	//	Component1	[→ 1 selected	×
Flip Motion		Component2	Select	
▼ Motion		▼ Alignment		
and the second sec		Flip		
Type 🖬 Rigid 👻		▼ Motion		
		Туре	🔜 Rigid	,
		0	OK	Cancel

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



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



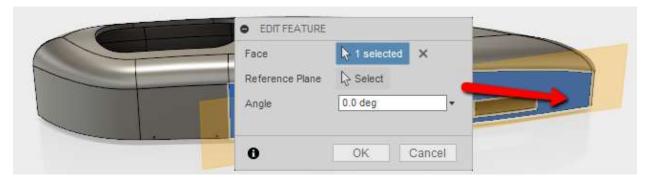
4. Create .25 inch holes at both points that go 1 inch into both components

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

Placement Image: Constraint of the second seco	DEDIT FEAT	JRE			
Hole Type Image: Simple Depth 1 in Diameter 0.25 in Tip Angle 118.0 deg Extents Image: Simple Flip Direction	Plácement		T		
Depth 1 in Diameter 0.25 in Tip Angle 118.0 deg Extents Image: Compare the second	Face/Point	2 selected 🗙			
Diameter 0.25 in Tip Angle 118.0 deg Extents H Distance Flip Direction	Hole Type	U Simple	•		
Tip Angle 118.0 deg Extents Image: Distance Flip Direction ¹ / ₄	Depth	1 in	-		
Extents H Distance Flip Direction	Diameter	0.25 in	•		
Flip Direction	Tip Angle	118.0 deg			/
	Extents	↔ Distance	•	1	
Objects To Cut	Flip Direction	147 147			
	 Objects Te 	o Cut		R	
	0	OK Ca	ncel		

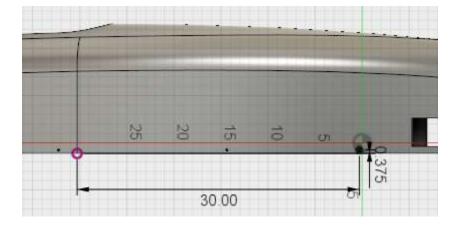
A. For additional holes, create tangent planes at the locations in the following images.

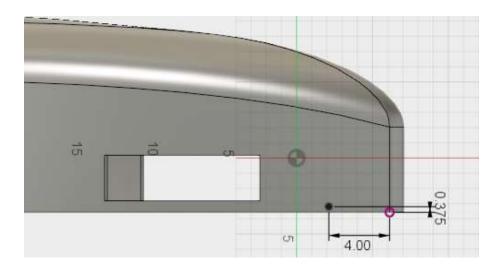
EDIT FEATUR				
Face	1 selected	×		
Reference Plane	🔓 Select			
Angle	0.0 deg			
0	ОК	Cancel		
EDIT FEATURE				
	▶ 1 selected ×	7		
EDIT FEATURE Face Reference Plane	▶ 1 selected ×	2		
Face				
Face Reference Plane	[∂ Select			



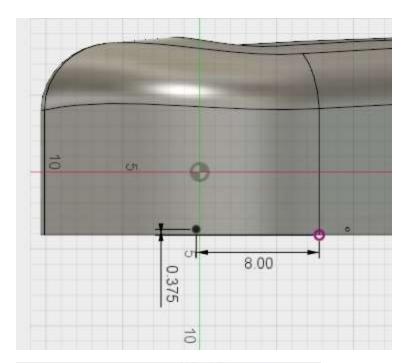
 COL	EDIT FEATURE	
	Face	1 selected X
	Reference Plane	l⊋ Select
2-	Angle	0.0 deg
	0	OK Cance

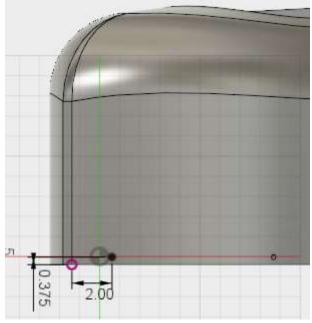
	Face	1 selected	×
	Reference Plane	[Select	
2	Angle	-5 deg	•
	0	OK	Cancel





B. Create a sketch with the following dimensions





Create .25 inch holes that are 1 inch deep/

EDIT FEATU	JRE			
Placement	P) 88			
ace/Point	▶ 1 selected ×			
lole Type	0 Simple			
Depth	1.00 in			
Diameter	0.25 in		 	
līp Angle	118.0 deg	•		
ixtents	↔ Distance			_
lip Direction	17. 17.			
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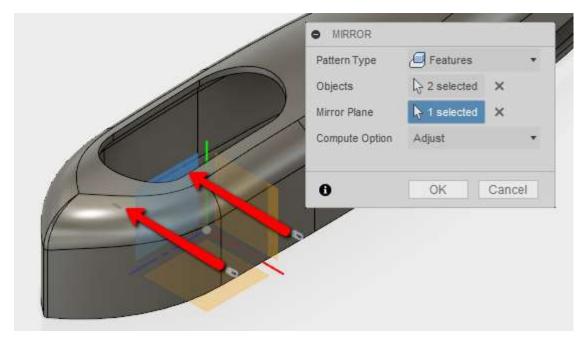
Nacement			
Face/Point	▶ 1 selected ×		
Hole Type	U Simple		
Depth	1.00 in	_• _	
Diameter	0.25 in		
Tip Angle	118.0 deg		
Extents	⊷ Distance	•	E
Flip Direction	禄		
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Plate	ement			
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Hole	Туре	Simple		•
Dept	th	1.00 in		•
Diam	neter	0.25 in		•
Tip A	Angle	118.0 deg		•
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> 0	bjects To (Cut		

	Placement		
	Face/Point	► 1 selected X	
	Hole Type	U Simple	
	Depth	1.00 in	•
19	Diameter	0.25 in	•
	Tip Angle	118.0 deg	•
	Extents	↔ Distance	
	Flip Direction	17 17	
Real Contractions	 Objects To 	o Cut	
		ок с	ancel

Exercise Six: Mirror hole features to other side

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

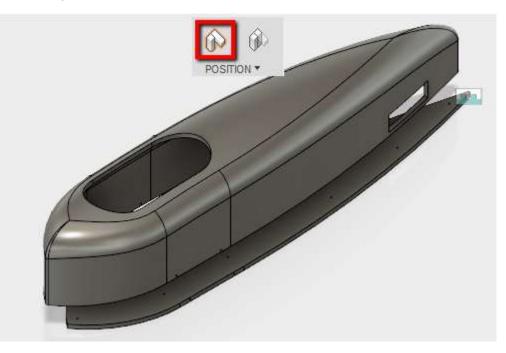


Note: Mirror all holes if extra steps were done.

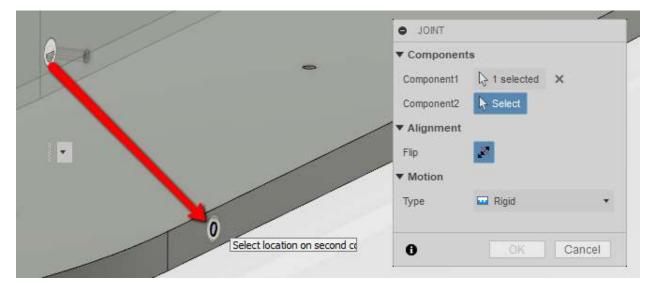
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Pattern Type	Features		•				
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 Mirror Plane	↓ 1 selected	×					
Compute Option	Adjust		•	-	_	 -	1
~//	OK	Cane		~	Ę		

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.

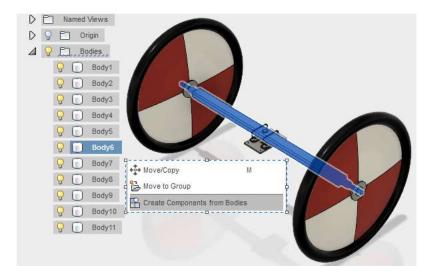


Exercise Eight: Using Sub-Assemblies

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



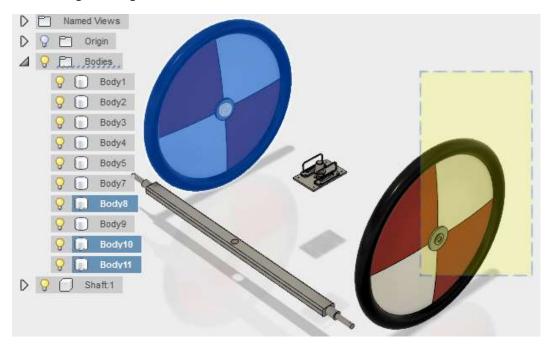
- 3. Open the new design and right click on the body for the shaft.
- 4. Select Create Component from Bodies



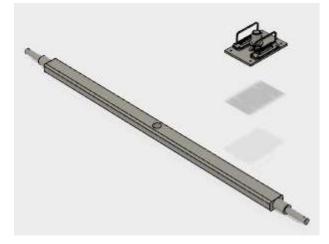
This will create a new component

5. Rename the new component Shaft.

Exercise Eight: Using Sub-Assemblies

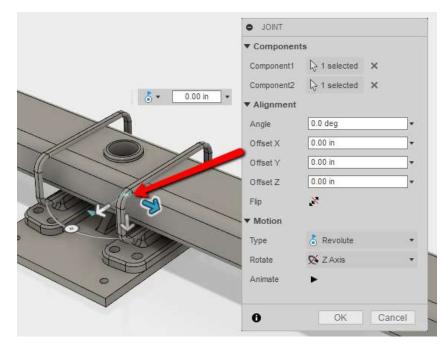


6. Select the wheel and washer bodies and delete them

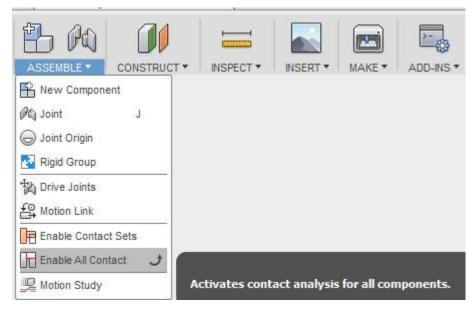


Exercise Eight: Using Sub-Assemblies

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.

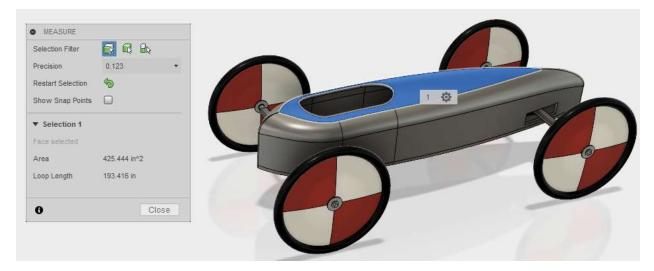
Exercise Eight: Using Sub-Assemblies

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:

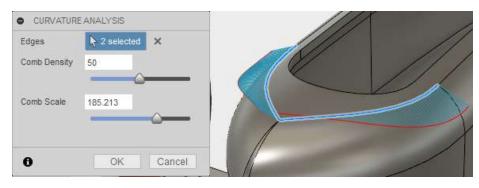
Interference will let you know if components are sharing the same space.

roups	Volume	Component 1	Component 2				
	3.992 in^3	Derby_Fuselage:1	DERBY_STEERING_AXLE:1			INTERFERENCE	
				Ale		Select	
						Include Coincident Faces	
						Compute	
				-			DK Can
							DK Can
					1		Ж

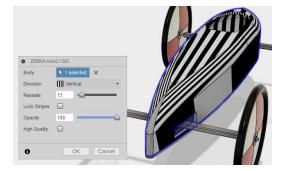
Inspect

Other ways to inspect your designs:

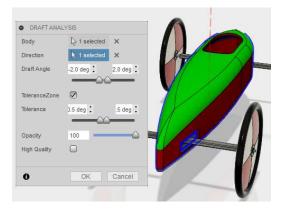
Curvature Comb can analyze the tangencies of a curved edge.



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



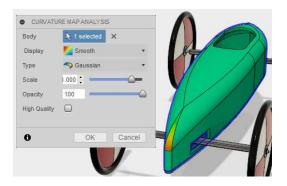
Draft analysis shows angle draft from a specified direction.



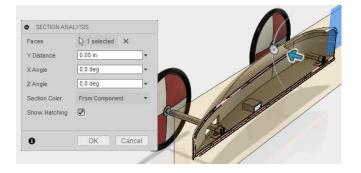
Inspect

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



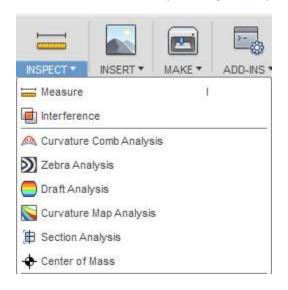
Center of mass displays on the object selected.

ENTER OF MASS		
ction 📐 Select		
OK Ca	Icel	

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

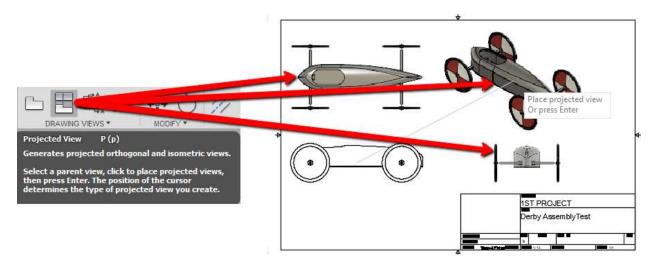
 Reference 		
Full Assembly		
 Destination 		
Drawing	🕂 Create New	
Template	From Scratch	*
Standard	ASME	•
Units	în	
Sheet Size	B (17in x 11in)	*

Exercise Nine: Create a drawing from a design

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

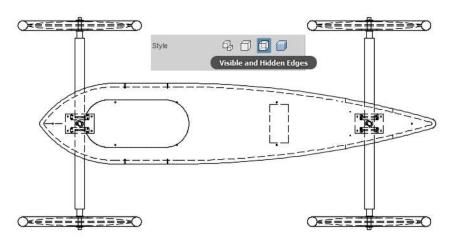
	🕀 Create New 🔹
	🔁 Model 🔹
Appearance	
Orientation	🗍 Right 🔹
Style	
Scale	1:15
Edge Visibility	
Tangent Edges	00
Interference Edges	
Thread Edges	D

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

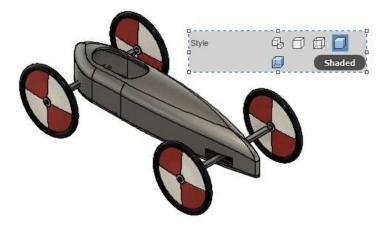


Exercise Nine: Create a drawing from a design

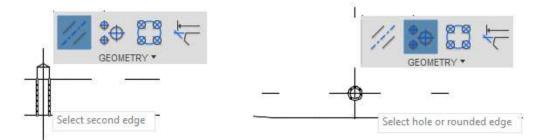
- 6. Right click the top view to edit the view
- 7. Change to wireframe with hidden edges.



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

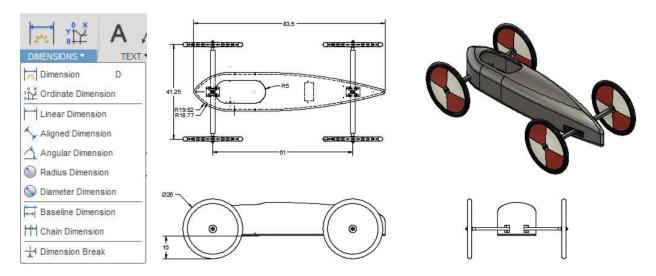


- 10. Create a centerline by selecting the edges of the diameter of the hole shaft.
- 11. Create a center line mark for the circular hole.



Exercise Nine: Create a drawing from a design

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

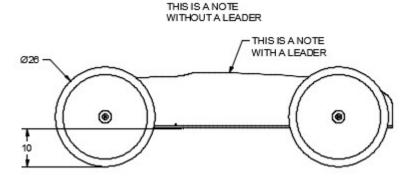


Drawing and Annotation

Exercise Ten: Create Notes

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





Exercise Eleven: Tables and Balloons

1. Add a parts list and balloons.

