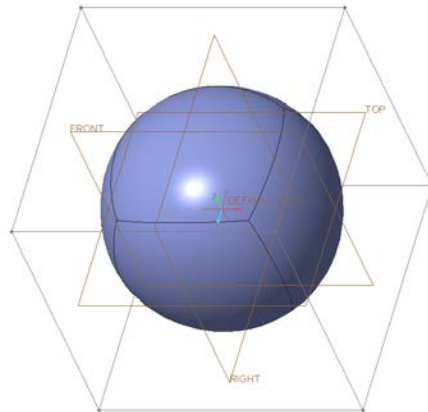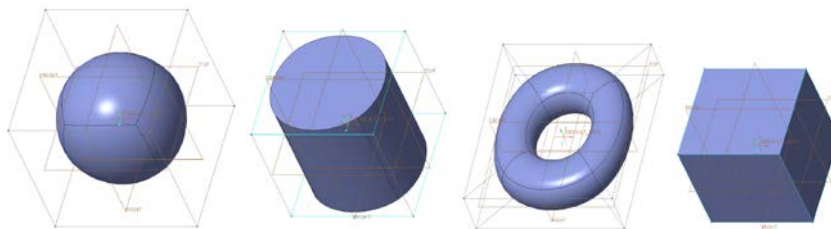# How to Model with Freestyle Primitives

## Creating arms, legs, heads, and all of those things

A freestyle primitive has six faces initially that we will be able to pull, rotate, push or scale to create different shapes. There are four basic primitive shapes that you can start with; a sphere, a cylinder, a torus (or donut), and a cube.

Each of these primitives is encased in an imaginary box whose edges are displayed as wires. You can push and pull on the faces of the box or on the wires themselves to change the shape of the primitive.
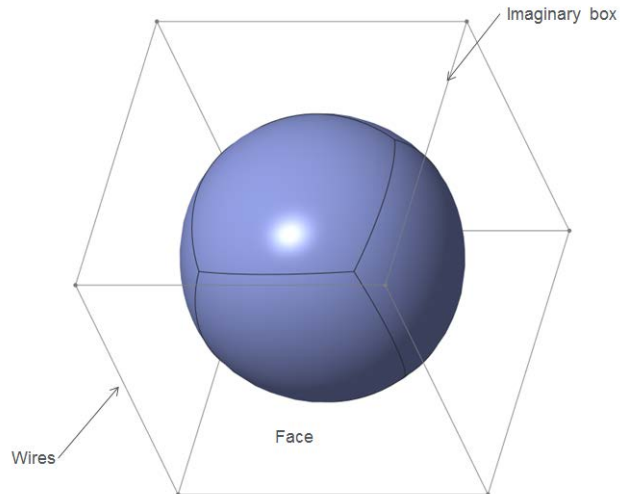
You can click on the face or edges or vertices to select them and then an orientation sphere appears that you can use to warp the primitive. For example you can click on an edge and then rotate the sphere and drag it in to warp the primitive as shown.
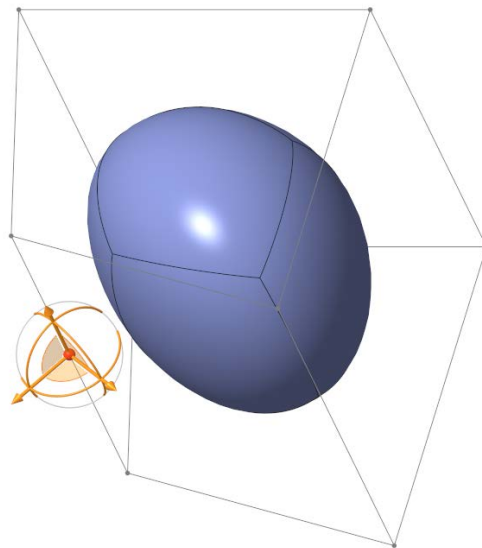

Once you have the shape you want, you need to change the primitive into a solid and you do this by "solidifying" it. We'll show you all of these operations in PTC Creo. So let's start by creating the squirrel's head. This is a simple spherical shape so all we will do is create a primitive using a sphere and then scale it so it is the right size and then we will solidify it.
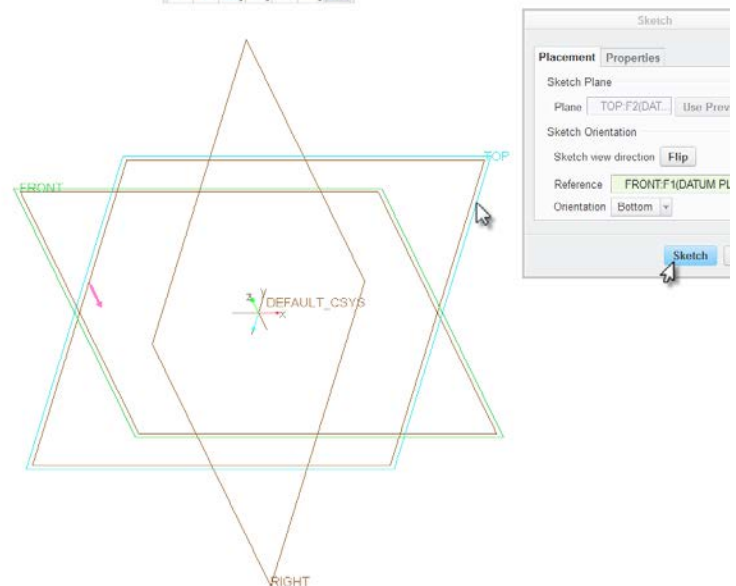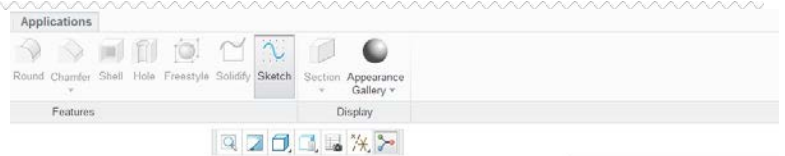
1. Open PTC Creo and set the working directory to the cartoon characters folder.
2. Select New and create a new part. Call it "round_head".
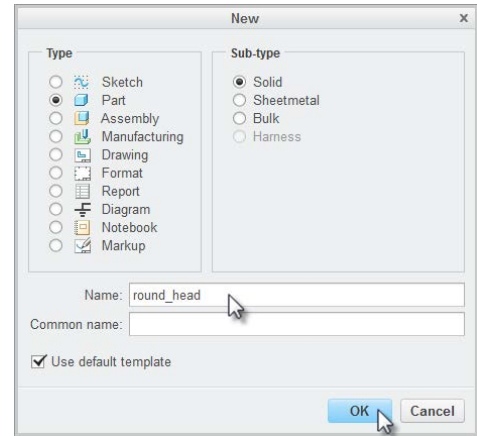
3. The first thing we will want to do is create a simple sketch of our squirrel's head to guide us. So click on the Sketch tab in the upper right menu.
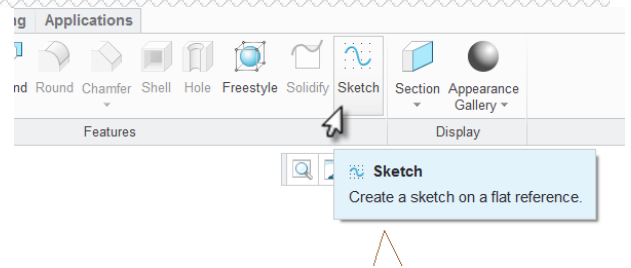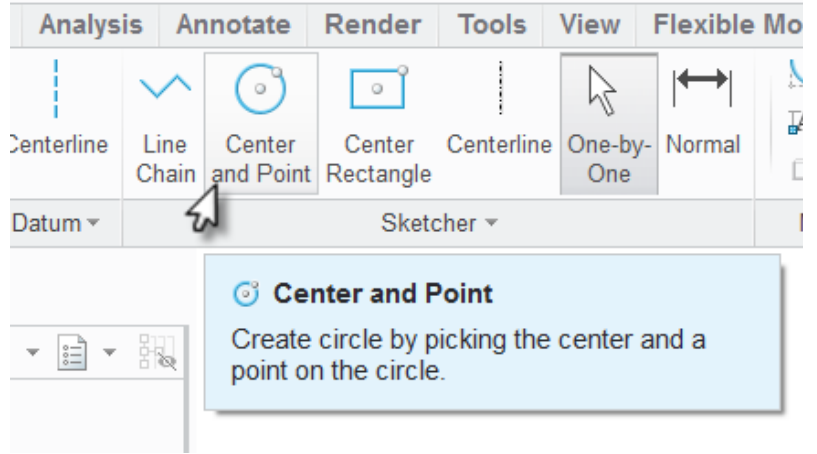
4. Select the top plane by left clicking on it. Then click Sketch in the dialog box.

5.

6. Click on the circle tool in the upper menu.

Analysis	Annotate	Render	Tools	View	Flexible Mo

Centerline   Line Chain   Center and Point   Center Rectangle   Centerline   One-by-One   Normal

Datum ▾   Sketcher ▾

Center and Point

Create circle by picking the center and a point on the circle.

7.

8. Click on the cross hairs to set the center of the circle and then move the cursor out and left click again to set the size of the circle.
9. Click the middle button to exit the circle tool.
10. *Note it doesn't matter what the dimension of the circle is at this point.*
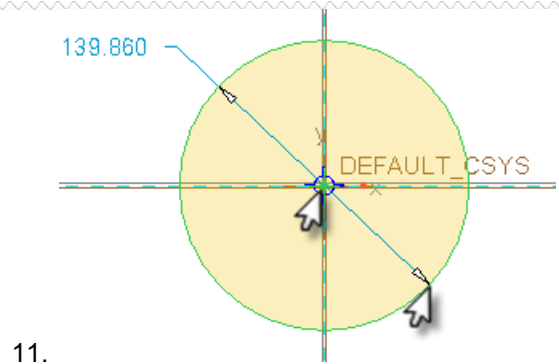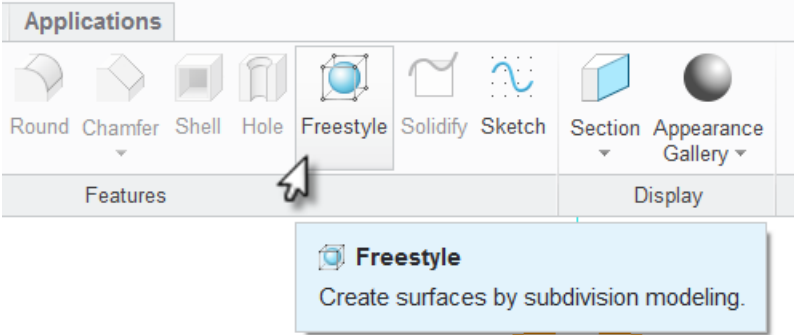
11.

12. Now double click the dimension and change it to 1.0 and click the green checkmark to finish the sketch of the circle.
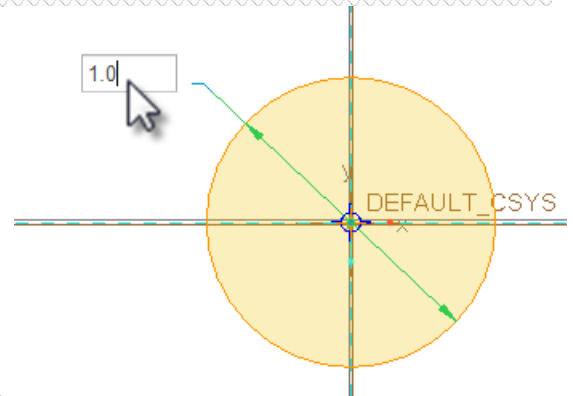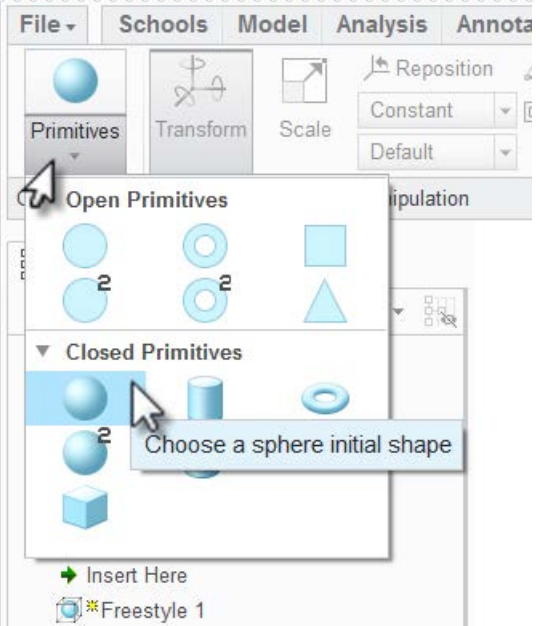
13.

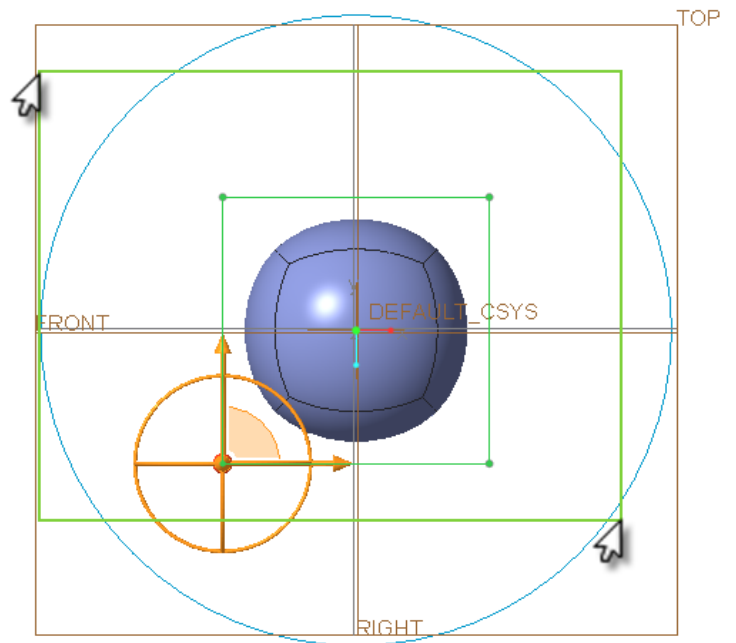14. Now select the Freestyle tool in the upper menu.

Freestyle
Create surfaces by subdivision modeling.

15.

16. Freestyle mode is where you can select basic shapes to build your cartoon characters.
17. Click on the Primitives tool in the upper left menu.
18. Now click on the sphere primitive.

File ▾   Schools   Model   Analysis   Annota

Primitives   Transform   Scale

Reposition
Constant
Default

Open Primitives

Closed Primitives

Choose a sphere initial shape
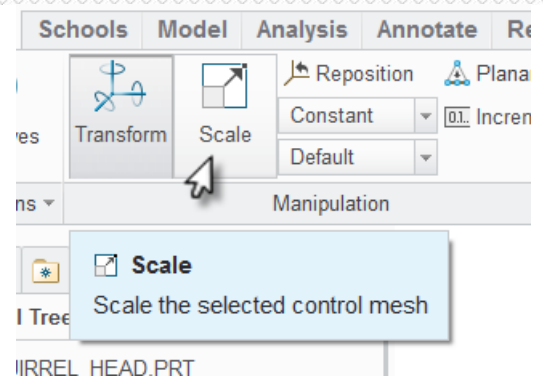
→ Insert Here
Freestyle 1

19.

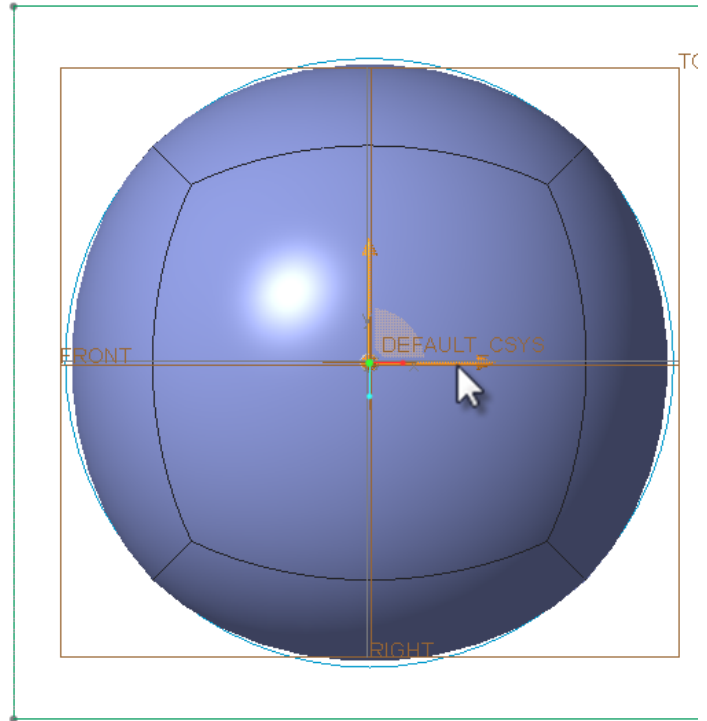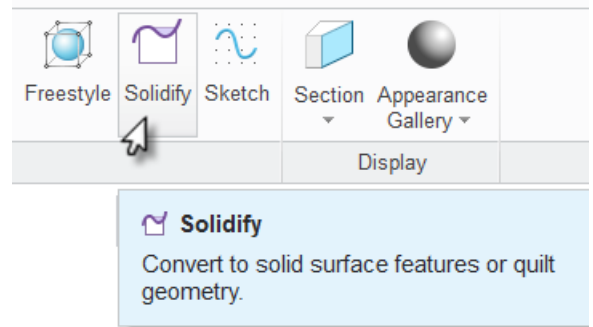20. Left click and drag a box around the sphere primitive to select it.
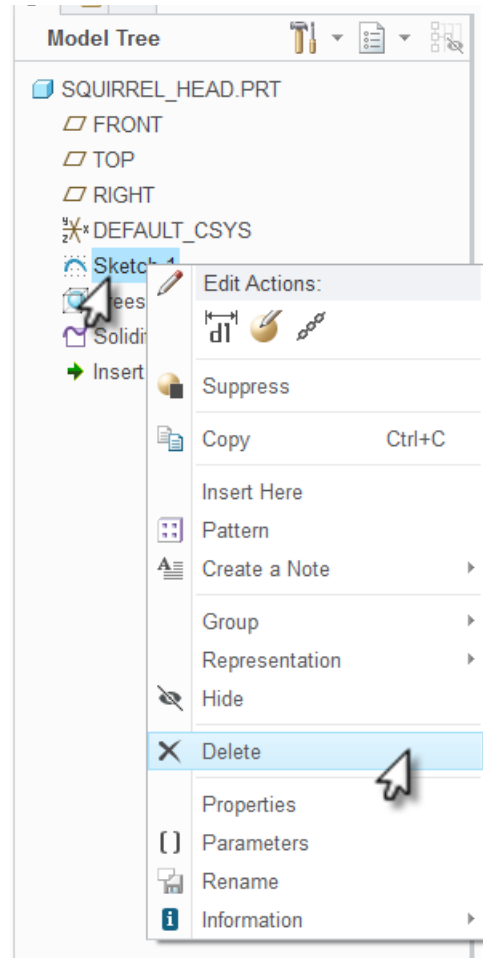

21.

22. Select the Scale tool in the upper menu.

23. Left click on one of the arrows in the center of the sphere and then click on the CTRL key and hold it down while you drag the sphere to the size of the circle you drew.
24. Then click on the green check mark to finish the freestyle tool.

25.

26. Now that we have created the basic shape of the squirrel head we need to change the freestyle primitive into a solid.
27. Select the Solidify tool in the upper menu
28. Now click on the green check mark to finish the solidify tool.

29.

Freestyle	Solidify	Sketch	Section ▾	Appearance Gallery ▾
			Display	

Solidify
Convert to solid surface features or quilt geometry.

30. Now that we have the basic head we don't need the sketch anymore so right click on it in the model tree and delete it.

Model Tree

SQUIRREL_HEAD.PRT
  FRONT
  TOP
  RIGHT
  DEFAULT_CSYS
  Sketch 1
  ees
  Solidi
  Insert

Edit Actions:

Suppress
Copy   Ctrl+C
Insert Here
Pattern
Create a Note   ▶
Group   ▶
Representation   ▶
Hide
Delete
Properties
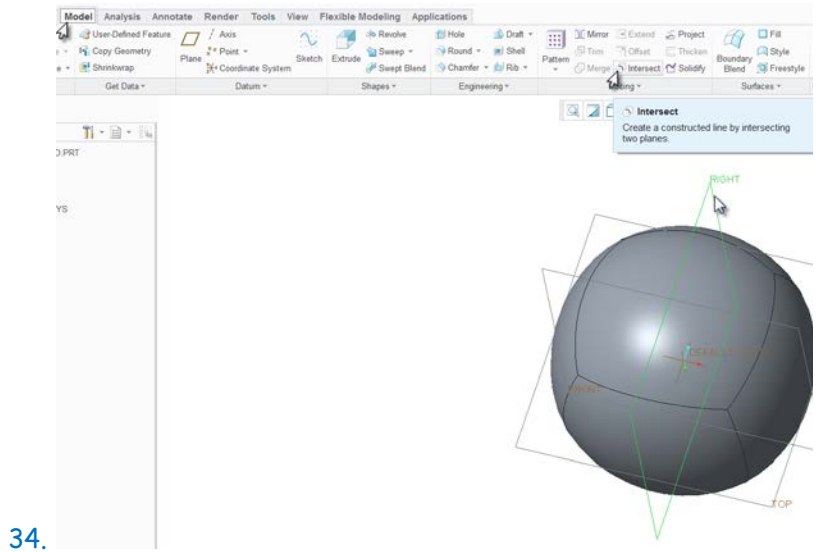Parameters
Rename
Information   ▶

31.

32. Use the middle mouse key to rotate so that the RIGHT plane is in the middle of the sphere and the TOP plane is oriented as shown.
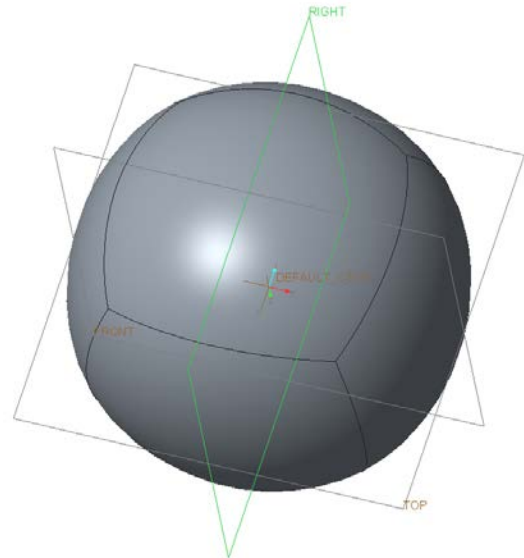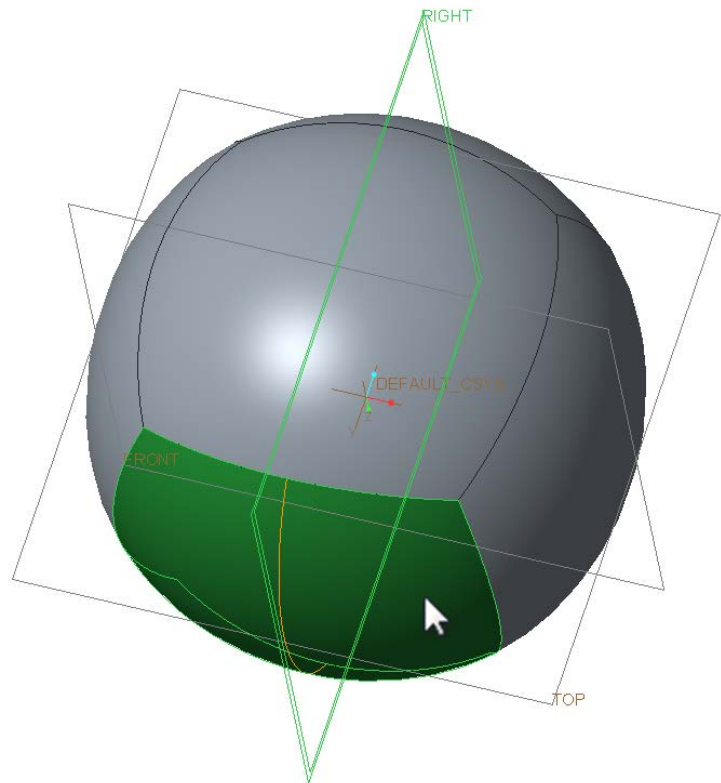
33. Now click on the Model tab in the upper menu and then select the Intersect tool.

34.

35. Hold the CTRL key down while you left click on the front surface. You will notice an orange curve appear. We will use this to help orient the eyes.
36. Click on the green check mark to finish the intersect tool.

37.

38. We will need another curve to help us locate the eyes, nose and mouth.
39. The doodles and sketches we made before starting PTC Creo will guide us again.
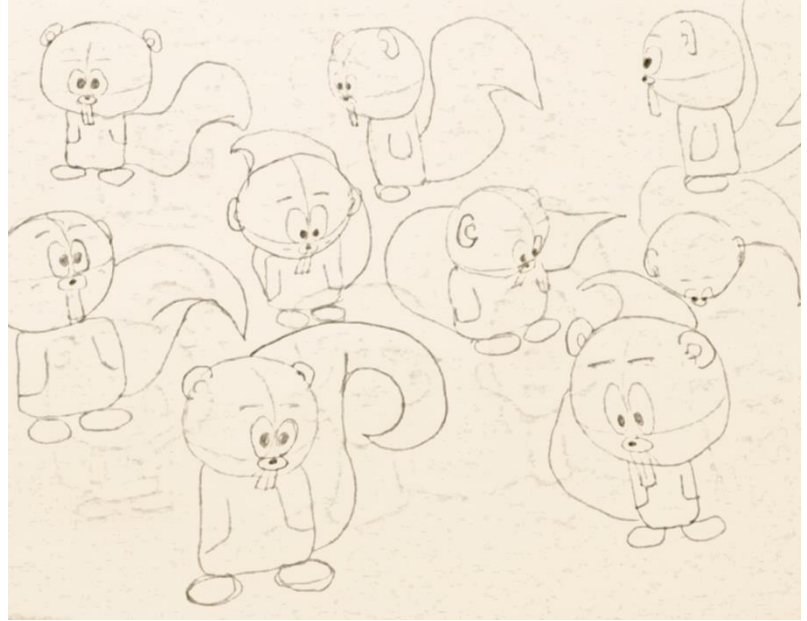
40.

41. We have created the line that intersects the head between the eyes. Now we need to create the lower line. We are going to make it a little lower on the head because that will make the squirrel look younger and cuter.
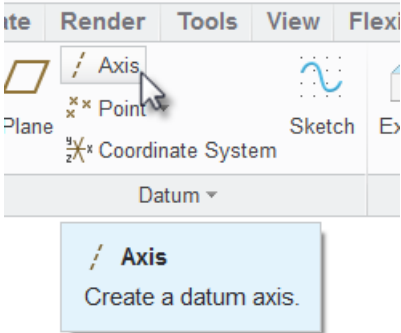

Guiding line
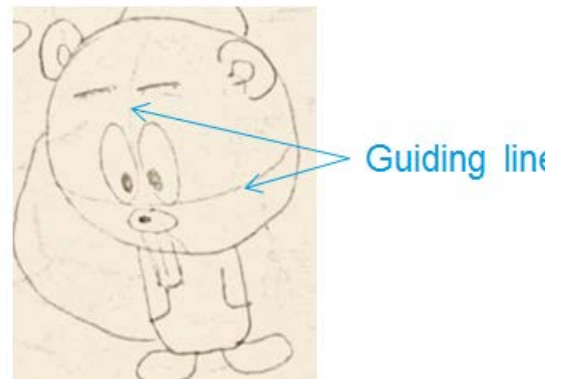
42.

43. Let's create a new datum plane so that we can intersect it with the head to create the lower line.
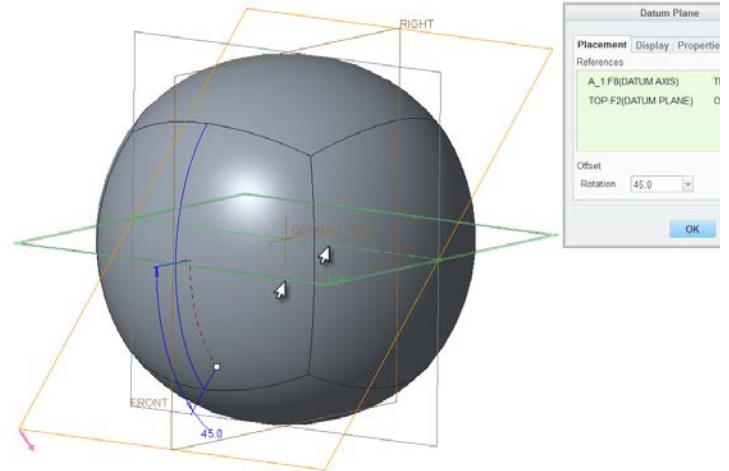44. Click on the TOP datum plane and the FRONT datum plane using the CTRL key.
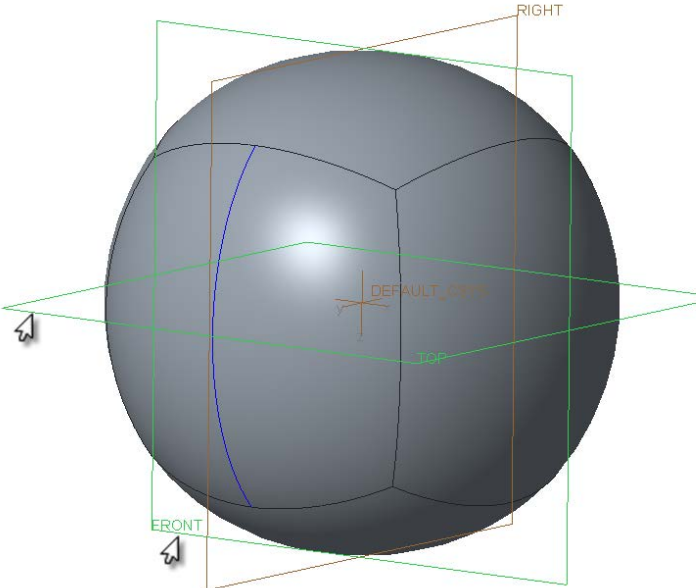
45.

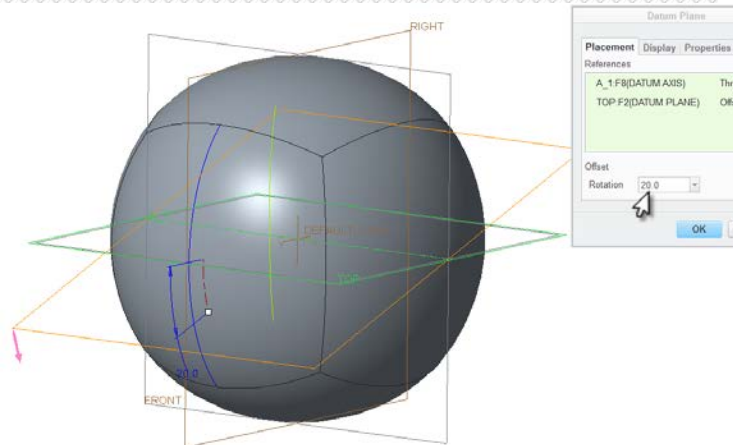46. Now up in the Datum Plane tool area select Axis to create an axis.

47.

48. Now select both the new axis and the TOP plane and then click on the datum Plane tool in the upper menu to create a new plane at 45 degrees.
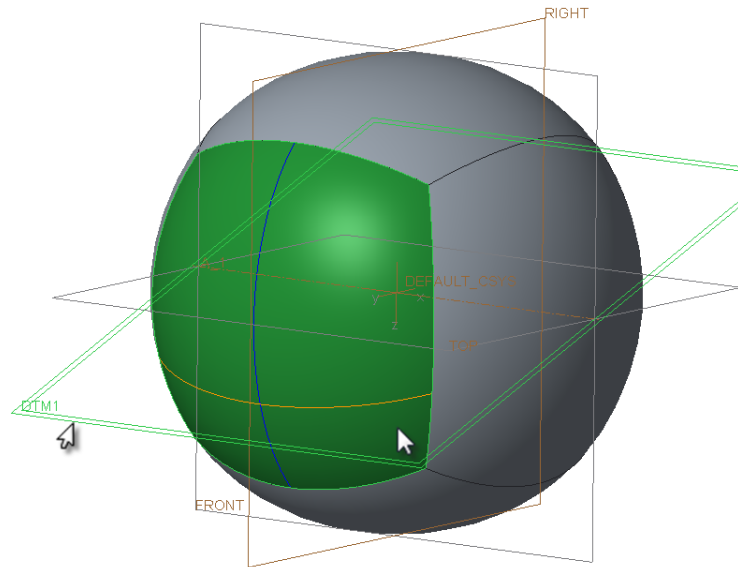
49.

50. Set the degrees to about 20 so that the new plane is a little lower than the TOP plane
51. Click OK.

52.

53. Select the new plane and then click on the INTERSECT tool in the upper menu.
54. Then hold down the CTRL key and left click to select the front surface of the sphere.
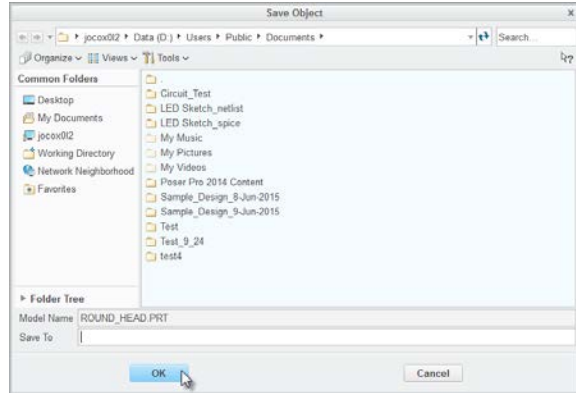55. You will see the curve created on the sphere.

56.

57. Turn the display of the datum planes off by selecting the datum filter tool and deselecting all of the check marks.
58. Now we have the lines on the sphere that will guide us in placing the eyes, nose, and mouth.
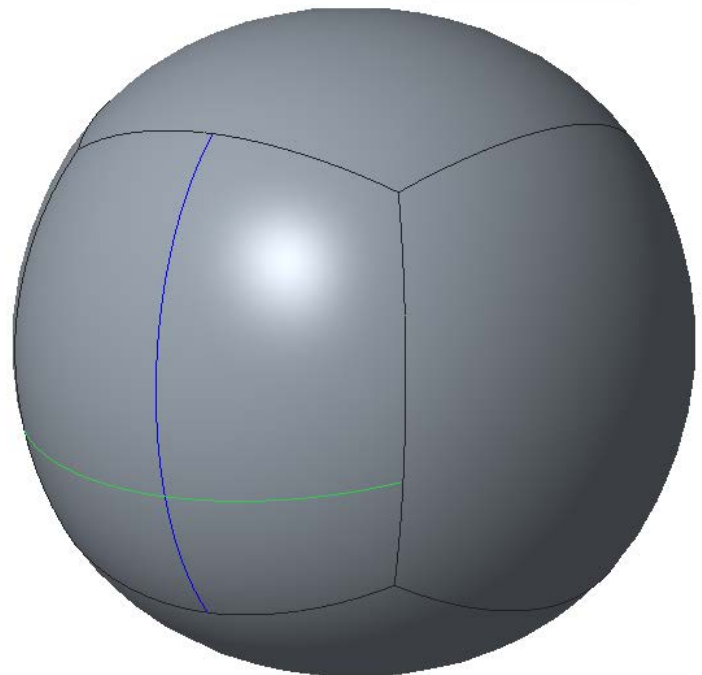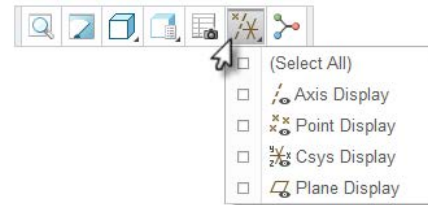
59.

60. Go ahead and save the head by selecting Save and clicking OK.

61.

Let's review what you have learned:

- You know to create a sketch to give you a reference size.
- You know how to enter the Freestyle mode in PTC Creo.
- You know how to select a primitive and how to scale it.
- You know how to solidify a primitive.
- You know how to create curves on the surfaces of the primitive.

Now we will show you how to warp and change the shape of a primitive. First let's talk about the different tools you will be able to use. There are two different tools you can use with a primitive; translate and scale. You already used the Scale tool to change the size of your squirrel's head. The Translate tool allows you to stretch or squish your primitive. You use the orientation sphere and select a face, edge or vertex and then use the arrows or circles of the orientation sphere to stretch or squish.
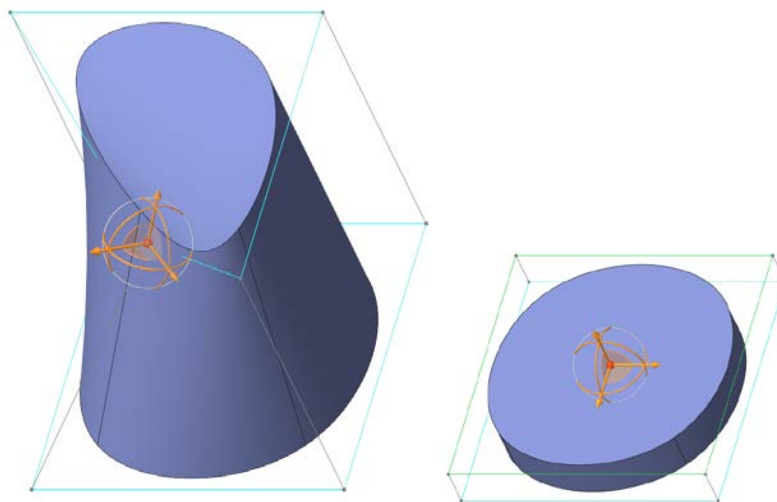
There are many more tools you can use to customize your primitives. We will show you two more that you can use. If you look closely at the primitives you will notice that there are surfaces that are related to the faces of the enclosing box.
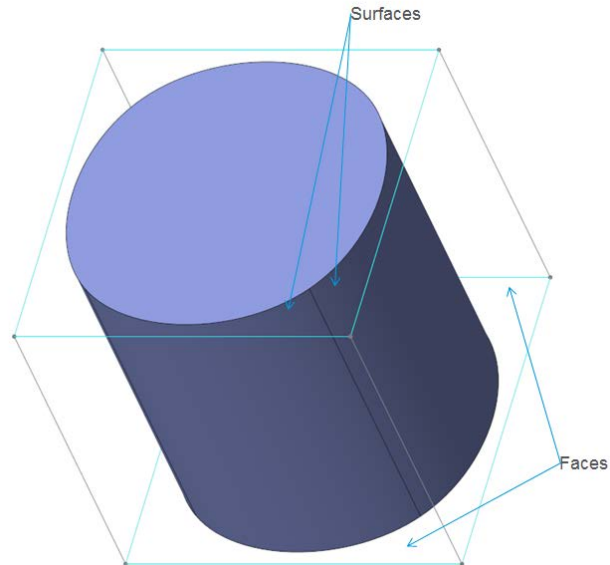

As you manipulate the faces of the enclosing box the associated surfaces are stretched or squished. If you want more surfaces so that you can do more custom manipulation, just use the Face Split tool. First select the face you want to split and then click on the pull down menu next to the Face Split tool and select the type of splitting you want.
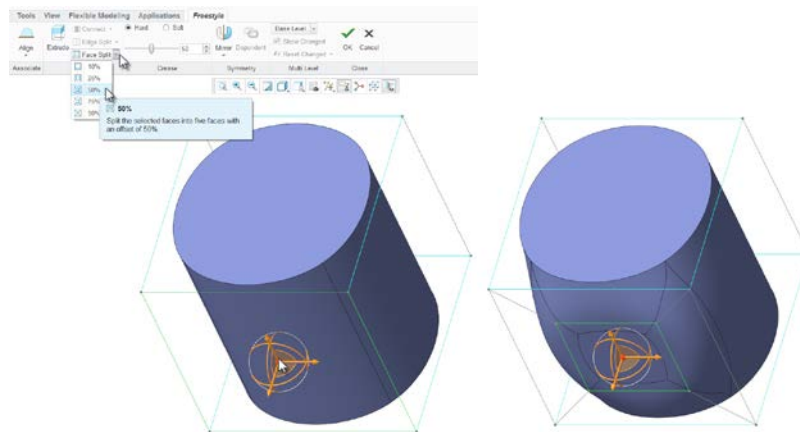

Notice that we now have 5 surfaces where we just had 1 before. This allows you to manipulate more but it also makes the primitive less of a

standard shape. You can play around with these tools and find the things that will help you create the kinds of characters you want.

Let's show you one more tool in Freestyle that may be helpful. It is called the Mirror tool. It allows you to create symmetry as you manipulate the freestyle primitive. We'll show you how this works with a sphere primitive. If you select a face by left clicking on it and then select the Mirror tool, you will then be required to select a datum plane around which everything will mirror. In this case we will select the FRONT plane.
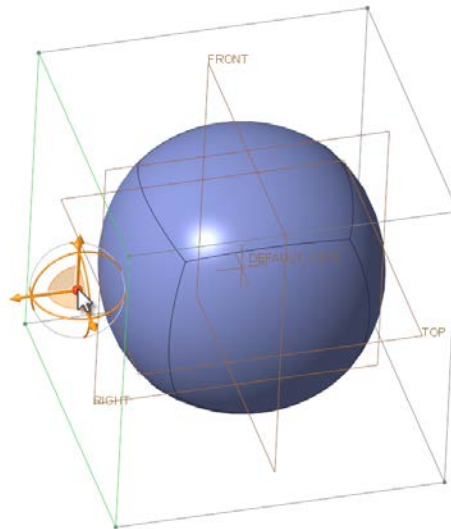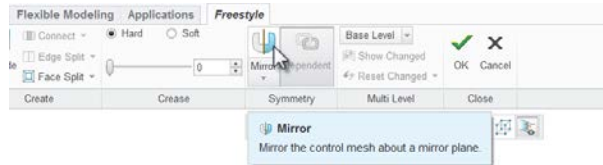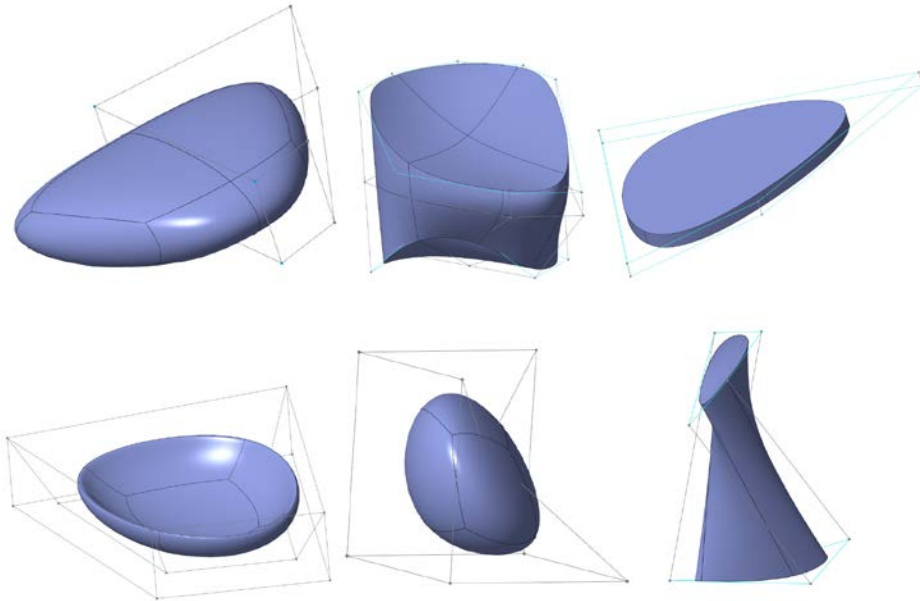

Once we have done this, we will then select the opposite face and begin to manipulate it and notice that all of the changes are mirrored on the opposite face.
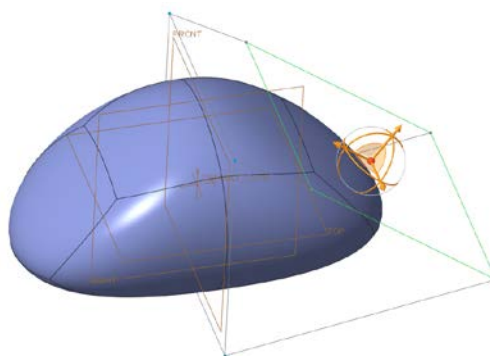
The mirror tool can be very helpful in creating symmetric shapes. Using all of the tools available and playing around a little you can make a wide variety of shapes.

Once you finish using the Freestyle tools and solidify your primitive, you can then use all of the other regular solid modeling tools like rounds, chamfers, etc. For example here is a solidified freestyle solid with a round being applied.
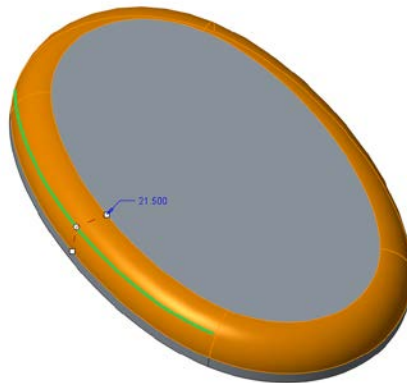
There is one more operation that is useful. Sometimes when you are creating a cartoon character you find that the eye or feet are too big or too small and you want to SCALE them. This can be easily accomplished using a scale operation.
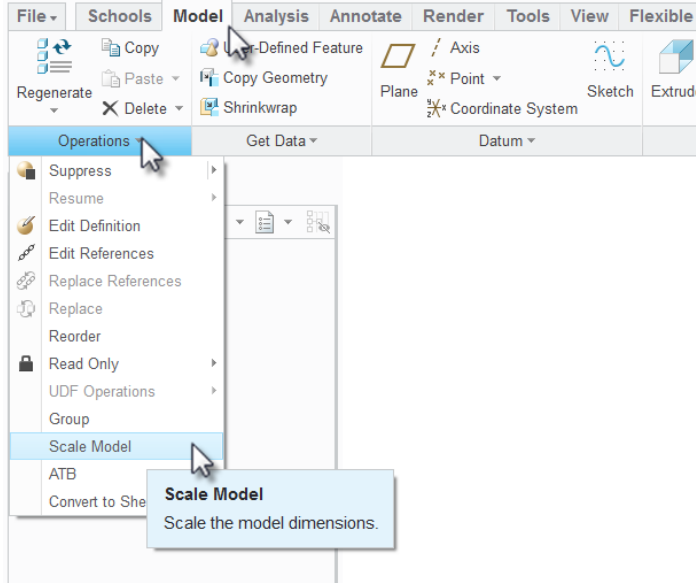
In the Model Tab under Operations you will find the Scale Model command. If you select this, Creo will ask for a scaling factor. Once you provide the scaling factor the model will be scaled. Only models can be scaled this way not assemblies.

So now use your new found skills to create your cartoon characters' heads, feet, legs, arms, eyes, ears, etc. Have fun and be creative.