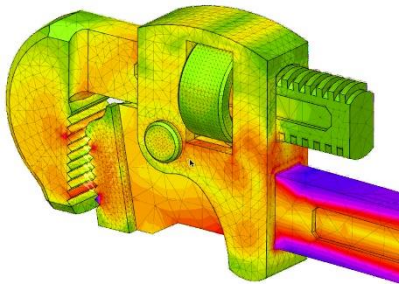

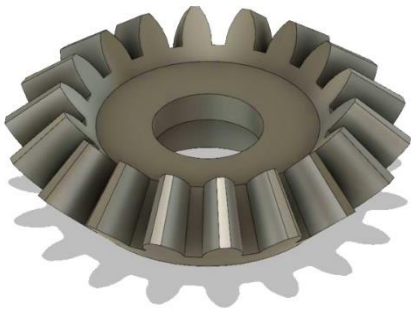

"Fusion 360" Lab

Lecture 2

Lebanese University - Faculty of Engineering – Branch 3

Fall 2022

Dr. Ali HARKOUS

Contents

Lecture 2:

Chap2: Creating the first feature with Quick shapes

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2.1. Design units and origin

In the Autodesk® Fusion 360® software, the first solid feature that you create in your design can form the foundation on which other features and geometry are built. One way to create this first solid feature is to use one of the available quick shapes.

In addition to the default named views, the BROWSER of a new design also includes the **Document Settings** node, under which units are set, and the **Origin** folder.

2.1. Design units and origin

⦿ Units

The default unit for a new design is millimeters (mm), as indicated in the **Units** node of the BROWSER, shown in Figure 2–1.

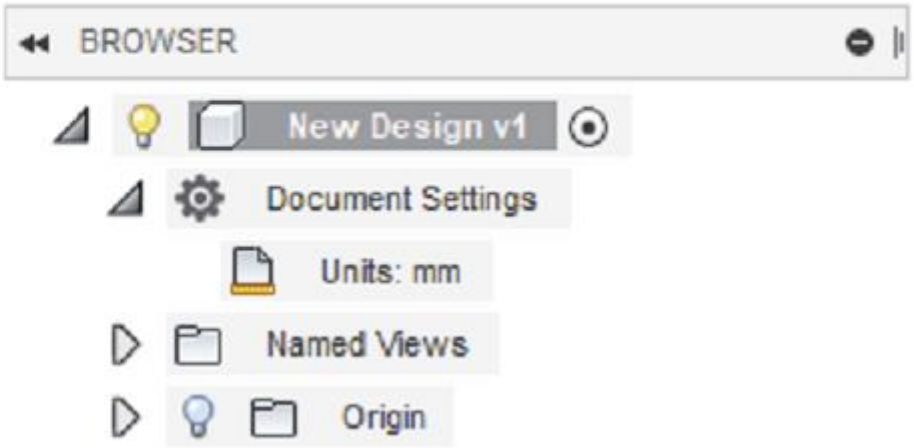


Figure 2–1

2.1. Design units and origin

⦿ Units

To change the active units, in the BROWSER, hover the cursor over the **Units** node and click  (Change Active Units). In the CHANGE ACTIVE UNITS palette, you can select one of the unit types shown in Figure 2–2.

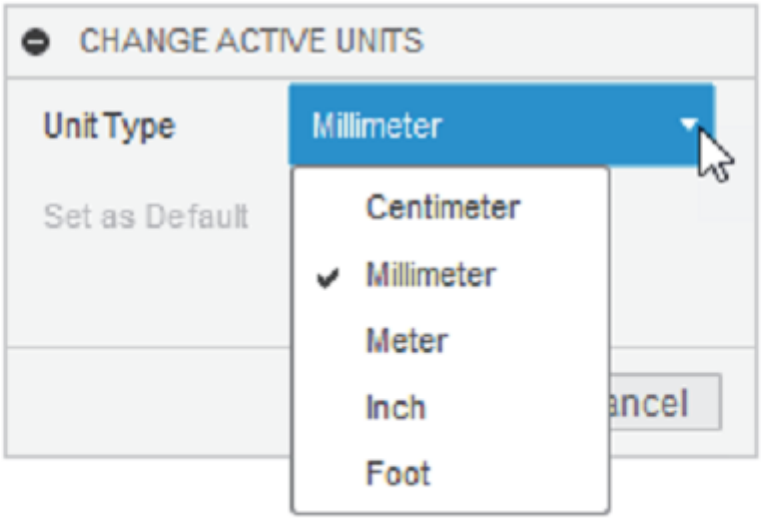


Figure 2–2

2.1. Design units and origin

⦿ Units

Once a new unit is assigned, you can select **Set as Default** to ensure that all new designs use the set unit type.

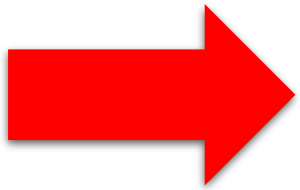
You can change the default units for a new design in the Preferences dialog box.

2.1. Design units and origin

⦿ Origin

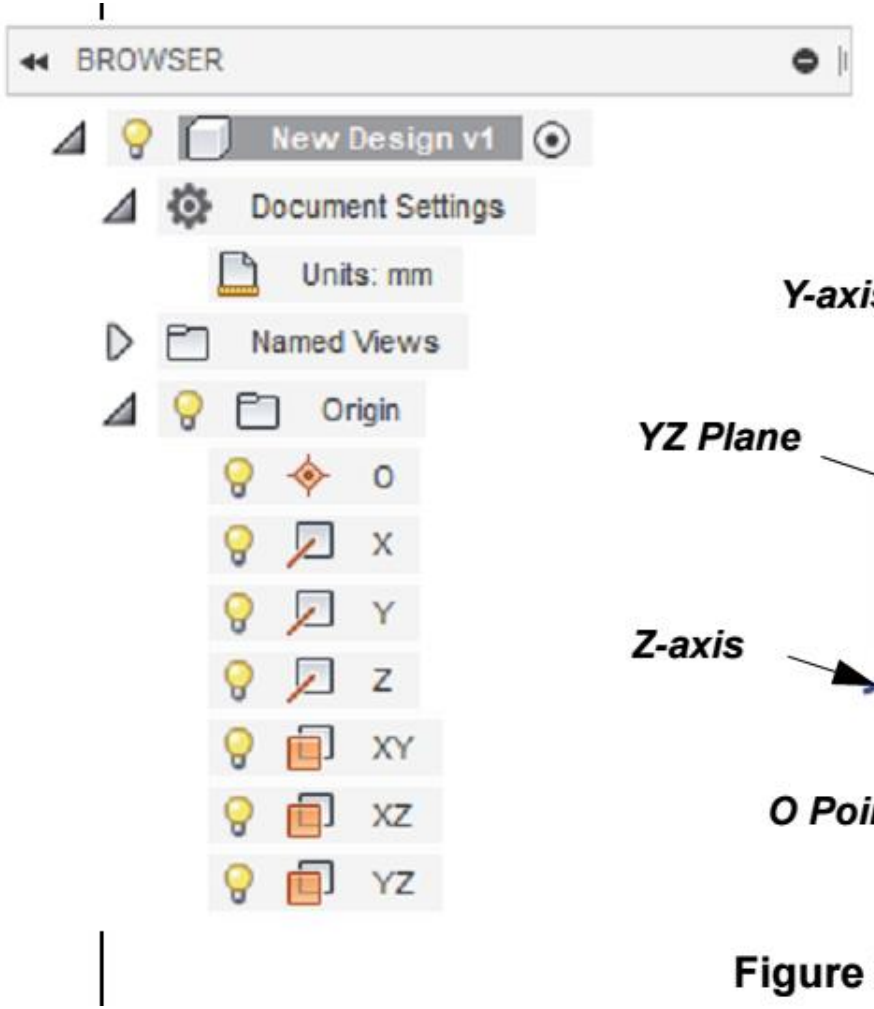
The *Origin* folder in the BROWSER (shown in Figure 2–3) contains the following items:

- Three orthogonal planes: XY plane, XZ plane, and YZ plane
- Three axes: X-axis, Y-axis, and Z-axis
- A center point O at the default (0,0,0) location



2.1. Design units and origin

⦿ Origin



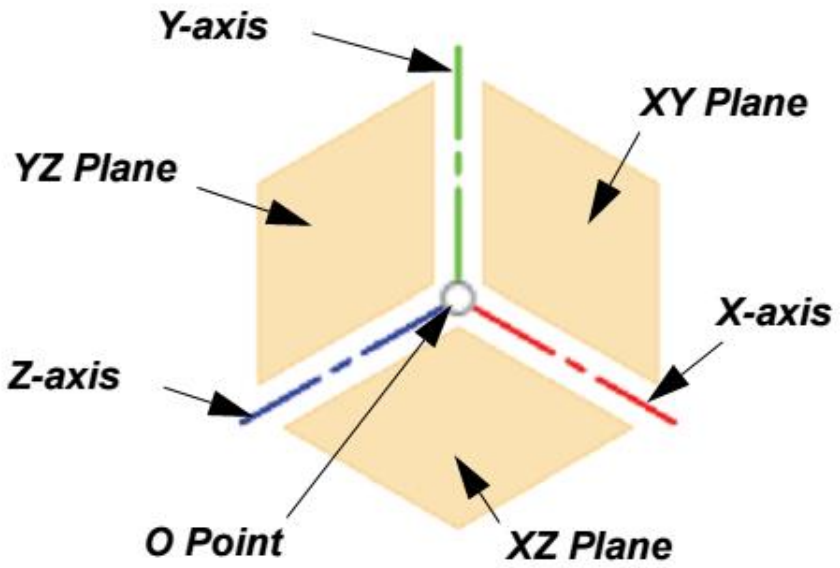


Figure 2–3

2.1. Design units and origin

⦿ Origin

By default, when you create a new design, the origin features are not displayed because visibility is turned off for the *Origin* folder.

Click  to display the origin features.

If the origin feature visibility is off, the origin features are temporarily displayed when creating a new sketch to enable you to select a sketch plane. Once the sketch plane is selected, they are removed from the display.

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2.2. Quick shape creation

The Autodesk Fusion 360 software includes quick shape creation tools that enable you to create the first solid feature as one of five quick shapes. Using these tools, you can draw the sketch and the 3D shape in at the same time.

The five quick shapes are **Box**, **Cylinder**, **Sphere**, **Torus**, and **Coil**, and are shown in Figure 2–4.

2.2. Quick shape creation

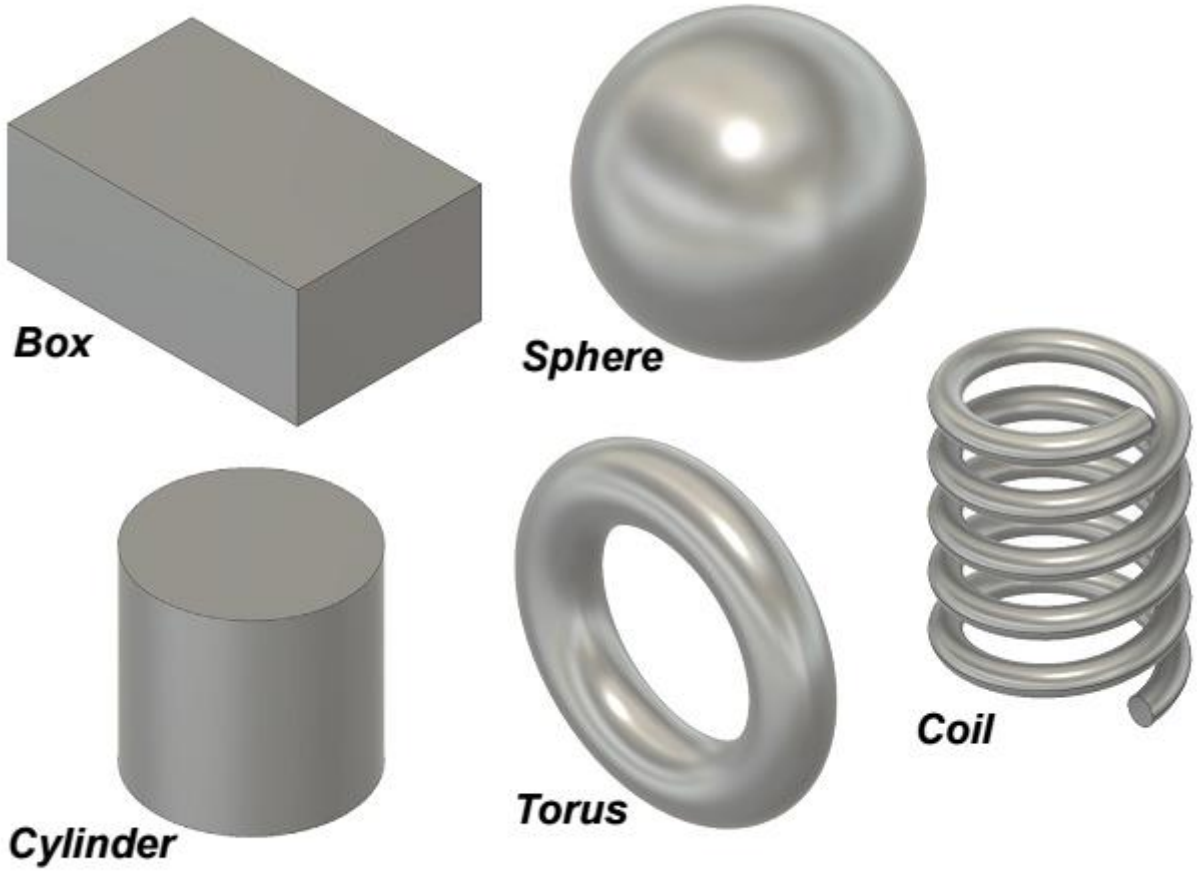

Figure 2–4

2.2. Quick shape creation

The quick shape creation options are located in the ribbon in the CREATE panel, as shown in Figure 2–5.

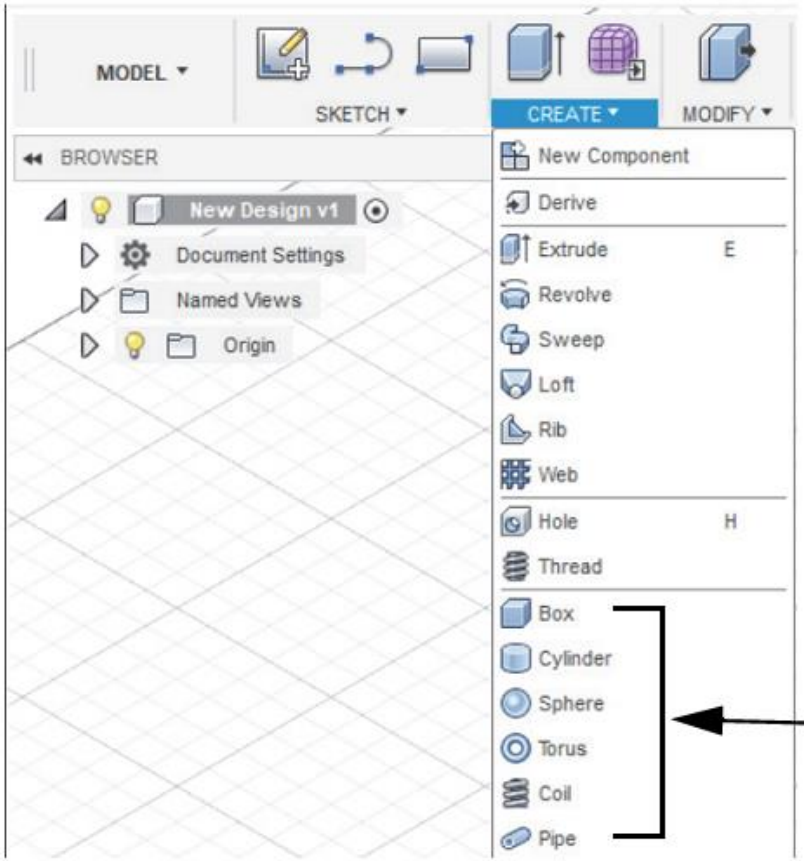

Figure 2–5

Command Summary

Button	Command	Location
	**Box**	• **Ribbon:** *Model* Workspace>CREATE panel
	**Coil**	• **Ribbon:** *Model* Workspace>CREATE panel
	**Cylinder**	• **Ribbon:** *Model* Workspace>CREATE panel
	**Sphere**	• **Ribbon:** *Model* Workspace>CREATE panel
	**Torus**	• **Ribbon:** *Model* Workspace>CREATE panel

Chap 2

Practice

Practice 1

Creating Shapes I

Practice Objective

- Create geometry using the Box, Cylinder, and Sphere modeling tools.

In this practice, you will learn the general workflow for creating some of the basic shapes that are available in the CREATE panel. You will start by following detailed steps to create a box using both free-form sizing and data entry. You will then create cylinder and sphere geometry to practice these steps and use more flexibility in how you define the size of the geometry.

Practice 1

Task 1 - Create a Box design.

1. Ensure that the *New Design* document tab is active. This is the new design that was created in the previous practice. If you did not finish the previous practice, complete the following:
   1. In the Application Bar, click  (File) to access the commands in the File drop-down menu.
   2. Click **New Design**.
   3. Click  (Save) in the Application Bar.
   4. Enter **New Design** as the filename and then click **Save**.
2. In the BROWSER, expand **Document Settings**. In the **Units** node, note that **Millimeter** is listed. This indicates that the new design is set to be created in millimeters (mm).

Practice 1

The ground plane lies on the XZ plane.

3. To change the active units, in the BROWSER, hover the cursor over the **Units** node, and click  (Change Active Units). In the CHANGE ACTIVE UNITS palette, you can select one of the unit types shown. Leave the units as **Millimeter** and click **Cancel**.

4. In the CREATE panel, click  (Box).When prompted to select a plane or planar face, select the XZ plane. To ensure that the correct plane is selected, you can expand the *Origin* folder in the BROWSER and select **XZ**, or you can select the plane in the graphics window.

5. Select any location on the grid to set the first corner of the rectangular shape.

Practice 1

Now that the start point is set, a tooltip prompts you to specify the size of the rectangle. There are two ways that you can do this. The following steps will show you the method that you can use if you do not need precise dimension values.

6. To create the box, drag the cursor to form the shape until you reach the required size and orientation of the rectangle sketch.

7. Click to create the box sketch. The shape is automatically given a third dimension, similar to that shown in Figure 2–6. Five manipulator arrows display surrounding the shape of the box, and the BOX palette opens.

Practice 1

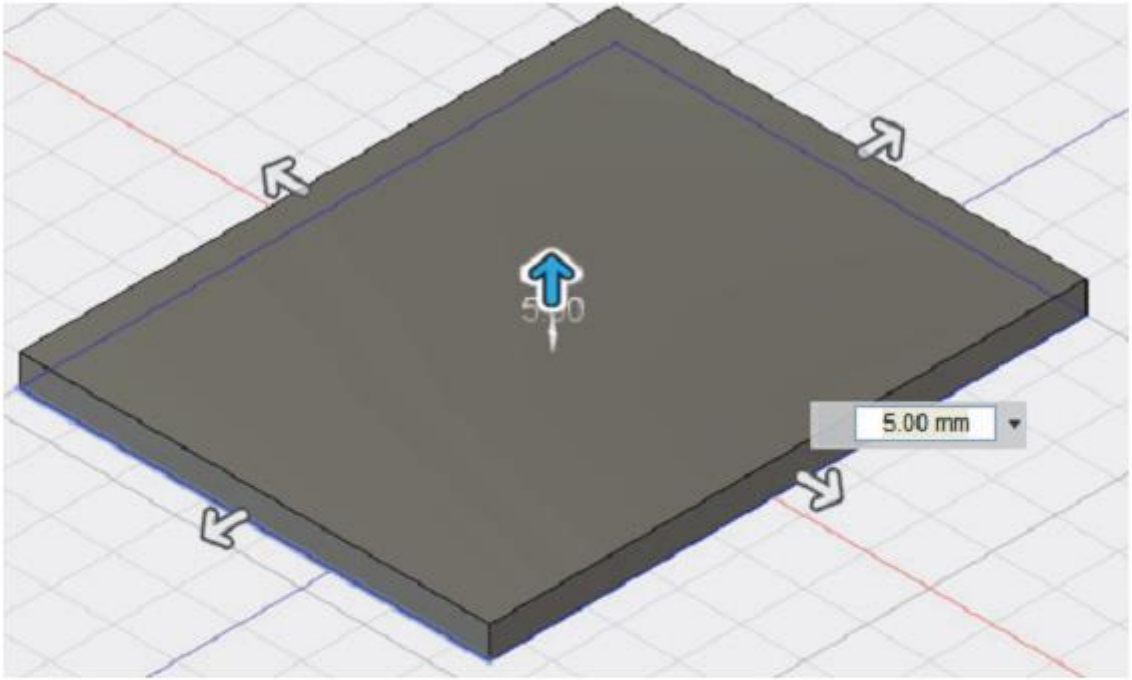

Figure 2–6

8. Select and drag any of the manipulator arrows to dynamically adjust the length, width, or height of the box.

Practice 1

9. In the BOX palette, click **OK** to create the box. Since this box was dynamically sized by dragging, the exact dimensions of the box are unknown.

10. In the lower left corner of the Autodesk Fusion 360 window, in the Timeline, hover the cursor over  , as shown in Figure 2–7. The icon is identified as **BoxPrimitive1** in the pop-up note and the box geometry highlights in the main window.

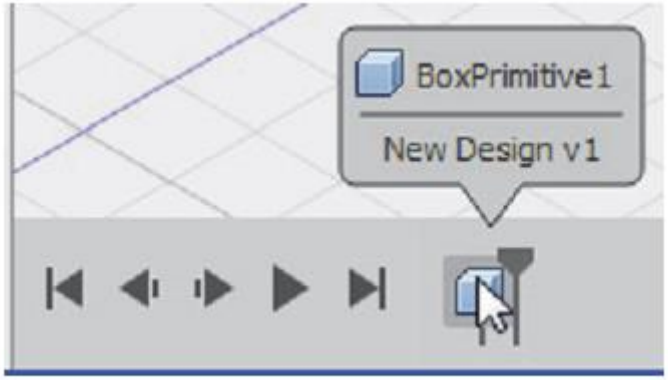

Figure 2–7

Practice 1

11. In the Timeline, right-click on  (BoxPrimitive1) and select **Delete** to delete the feature, as shown in Figure 2–8.

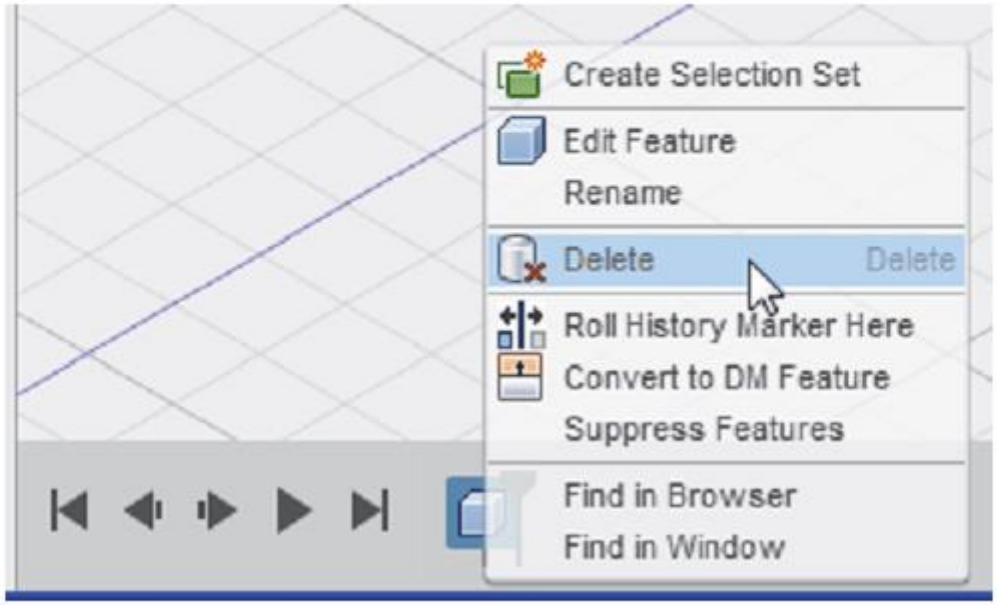

Figure 2–8

Practice 1

12. In the CREATE panel, click  (Box).

13. When prompted to choose a plane, select the XZ plane.

14. Select any location to set the first corner of the rectangular shape. To locate the first corner at 0,0,0, hover the cursor near  on the sketch plane. Once the cross-hairs on the cursor snap to this point, select it by clicking on it.

The following steps will show you the method that you can use if precise dimension values are required.

15. Begin to drag the box to define the shape and display the input boxes. Do not click to set the size of the shape.

16. In the active input box, enter **150**. The active input box is highlighted in blue.

Practice 1

17. To assign the entry and activate the next input box, press <Tab>.
    - As soon as you press <Tab>, a lock icon displays next to the entered value. This locks that dimension.
18. In the next input box, for the length, enter **300**. Press <Tab>. A lock icon displays next to both dimensions.
19. To finalize the sketch, you must select another point to lock the orientation of the box. Drag the cursor to the four quadrants relative to the start point of the sketch. Click inside quadrant one to create the box.

Practice 1

20. The shape is automatically given a third dimension. Five manipulator arrows display surrounding the shape of the box, and the BOX palette opens, as shown in Figure 2–9.

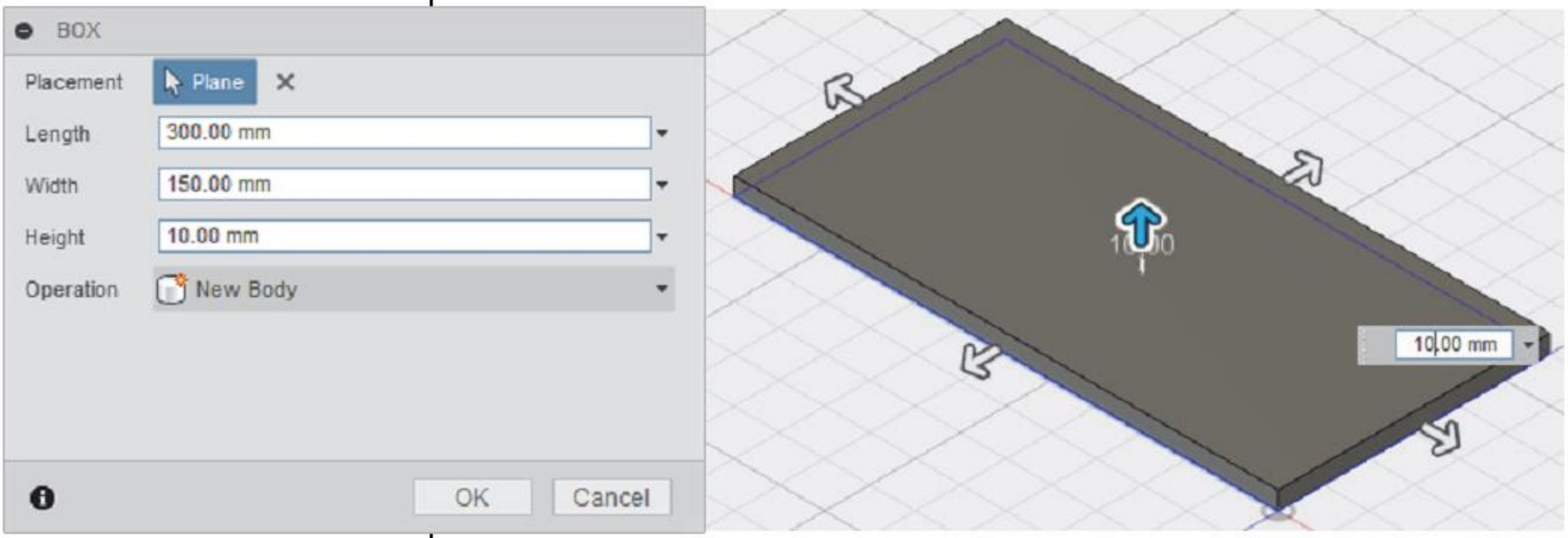

Figure 2–9

Practice 1

21. In the input box that displays on the geometry, enter a height of **100**. Alternatively, you can enter a *Length*, *Width*, and *Height* value in the fields in the BOX palette.

22. In the *Height* field, enter **150** to further change the shape.

23. Click **OK** to create the box.

24. In the Timeline, right-click on  and select **Edit Feature**. The five manipulator arrows display surrounding the box and you can use them to modify the size of the box. To enter precise values, either:
    - Enter values into the input boxes that display when you select a manipulator arrow, or
    - Use the EDIT FEATURE palette to enter values in the *Length*, *Width*, and *Height* fields.

Practice 1

25. Click **Cancel**.

26. In the Timeline, right-click on  and select **Delete**.

Practice 1

Task 2 - Create additional shapes.

In this task you will create the cylinder and sphere shapes. The creation workflow for these shapes is similar to the one that you used to create the box in the previous task. You will create the shapes using a combination of free-form manipulation and manual entry to define their size.

1. In the CREATE panel, select  (Cylinder).
2. Select the XZ plane.
3. Select any location to set the center of the cylinder.
4. Drag the cursor to expand the diameter until you reach the required size and then enter **150** in the input box. Press <tab> to lock the dimension value.

Practice 1

5. Click in the XZ plane to confirm the sketch. The cylinder is automatically given a third dimension, similar to that shown in Figure 2–10. Two manipulator arrows display surrounding the shape and the CYLINDER palette opens.

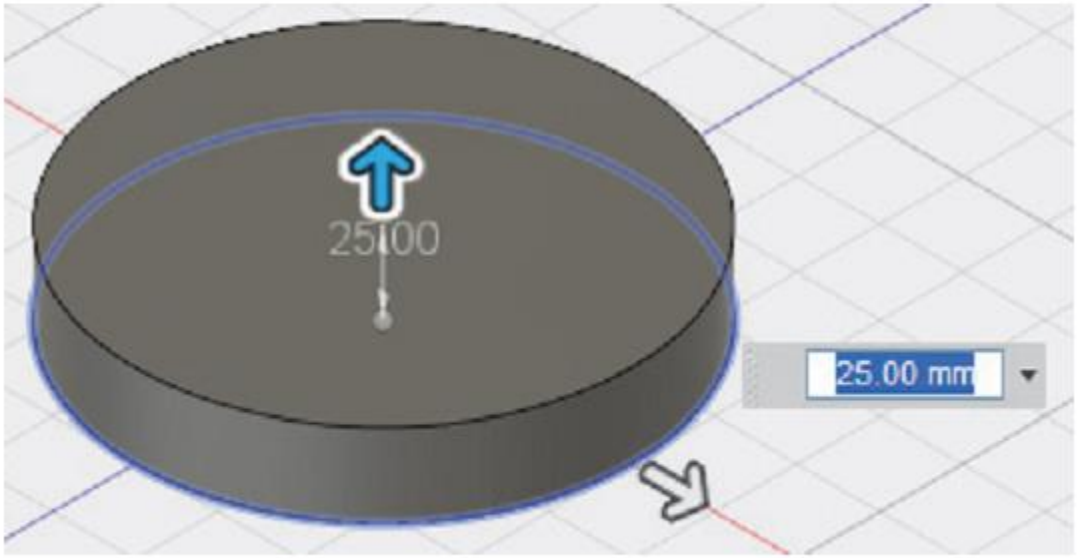

Figure 2–10

Practice 1

6. Drag any of the arrows to dynamically adjust the diameter or height of the cylinder.
7. Assign a height of **100** for the cylinder using one of the sizing options.
8. Click **OK** to create the cylinder.
9. In the Timeline, right-click on  and select **Delete**.
10. In the CREATE panel, select  (Sphere).
11. Select the XZ plane.
12. Select any location to set the center of the sphere.

Practice 1

13. Unlike the **Box** and **Cylinder** tools, the **Sphere** tool does not start with a sketch. Instead, as soon as you select the center point, a 3D sphere is immediately added, similar to that shown in Figure 2–11. One arrow displays surrounding the shape and the SPHERE palette opens.

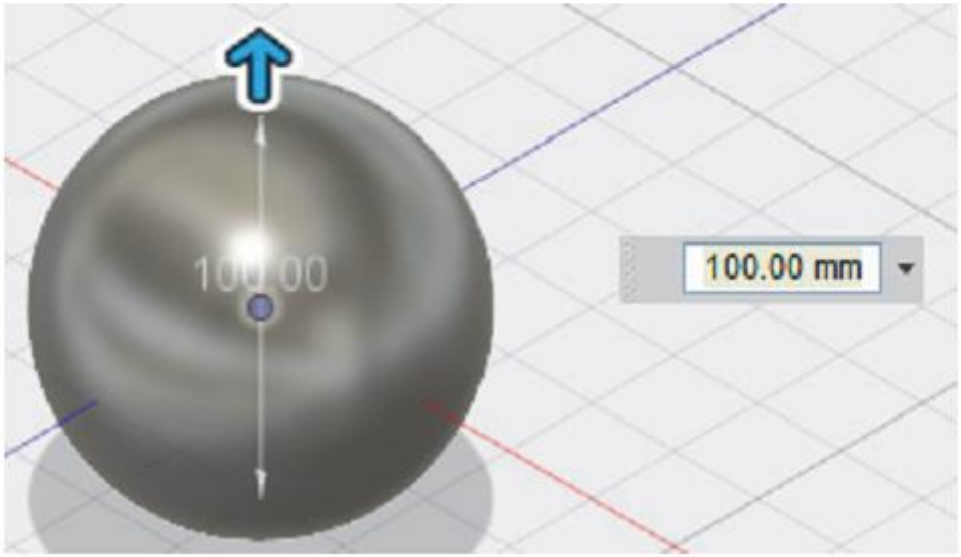

Figure 2–11

Practice 1

14. Drag the arrow to dynamically adjust the diameter, which is the only value that can be defined for a sphere.

15. Click **OK** to create the sphere.

16. In the ViewCube, select **FRONT**. Note that the center of the sphere is aligned on the XZ plane and that the geometry is created on both sides of the plane. Return to the **Home** view.

17. Save the file. Click  in the *New Design* document tab to close the file.

Practice 2

Creating Shapes II

Practice Objective

- Create geometry using the Torus and Coil modeling tools.

In this practice, you will continue to create shape geometry, similar to that in the previous practice. You will use the **Torus** and **Coil** options. When creating the coil geometry, only a final image is provided. You are expected to create similar geometry using your knowledge of the creation tools, palettes, and manipulator tools.

Practice 2

Task 1 - Create a Torus design.

In this task you will create a torus design. Shaped like a ring, a torus is a revolved circle with a hollow center. The steps for creating a torus are similar to that of the other shapes that have been previously discussed, but require additional selections that enable you to customize the size and how the internal hole is measured.

1. In the Application Bar, expand  (File menu) and click **New Design**.

2. In the BROWSER, in the **Document Settings>Units** node, note that **Millimeters** is listed as the default units. Maintain this setting.

Practice 2

The ground plane lies on the XZ plane.

3. In the CREATE panel, select  (Torus).
4. When prompted to choose a plane, select the YZ plane.
5. Select any location to set the center of the torus.
6. Similar to creating the other shapes, you can enter the diameter of the initial sketched circle or drag and click to define its size. Define the circle's diameter as **200**.
7. Click on the plane to create the torus. The shape is automatically given a third dimension, similar to that shown in Figure 2–12.

Practice 2

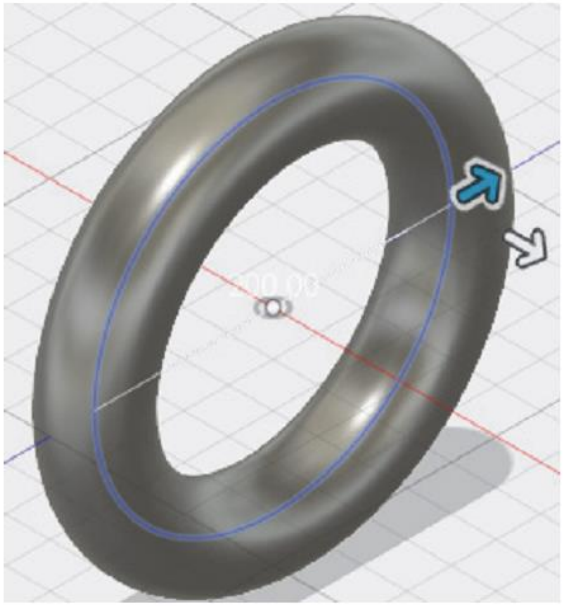

Figure 2–12

In the TORUS palette that opens, there are two different diameter values. The *Inner Diameter* is the diameter of the original circle that you created. The *Torus Diameter* is the thickness of the revolved circle around the original circle sketch. The *Torus Diameter*, by default, measures one-quarter of the size of the *Inner Diameter*.

8. Drag any of the arrows to dynamically adjust the size of the torus.

Practice 2

9. In the TORUS palette, expand the Position drop-down list, as shown in Figure 2–13. The Position determines where the *Torus Diameter* is in relation to the *Inner Diameter*.

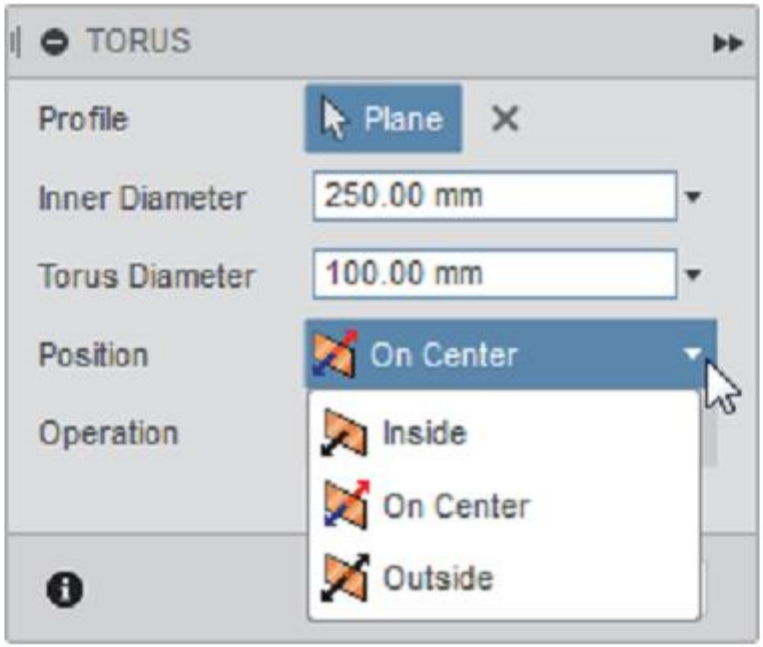

Figure 2–13

Practice 2

10. In the Position drop-down list, select the various options to review how the geometry reacts.

11. Select the **On Center** option and then click **OK** to create the torus.

12. Close the file without saving.