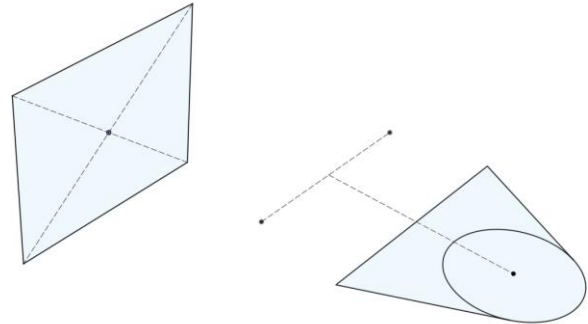


Lesson: How to Create a Sketch

In this lesson, you'll explore sketching, adding dimensions, and adding constraints in Fusion 360.

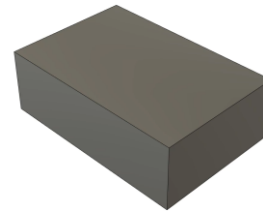
Learning Objectives

- Create a sketch.
- Use Constraints and Dimensions to define a sketch.

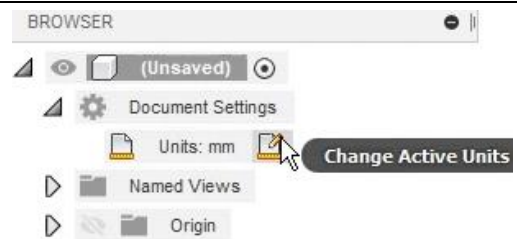


The completed exercise

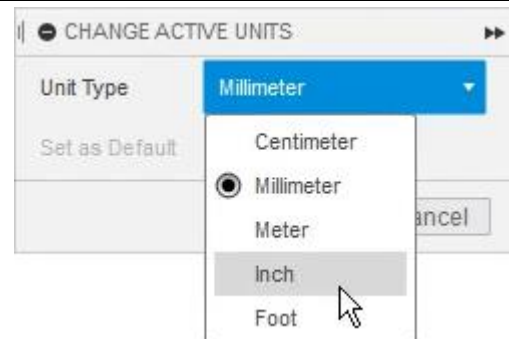
1. Open a new untitled document.



2. In the Browser, expand the Document Settings and note the units used for the current file. By default, Fusion 360 uses metric units. Change the units to standard by clicking Change Active Units.



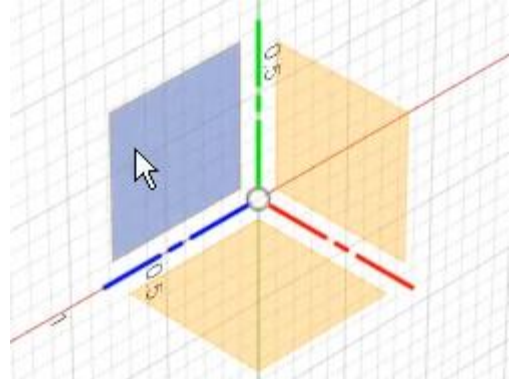
3. In the Change Active Units dialog, choose the Inch option. If you always want inches to be the default units, activate the Set as Default option inside the dialog. Click OK in the dialog to accept the change.



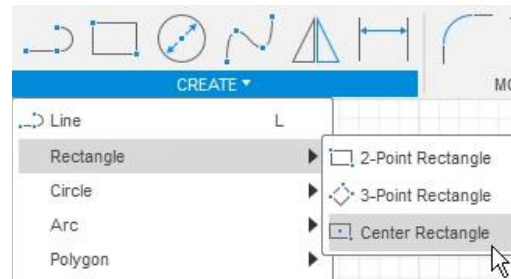
4. Create a new sketch by clicking Create> Create Sketch in the Toolbar.



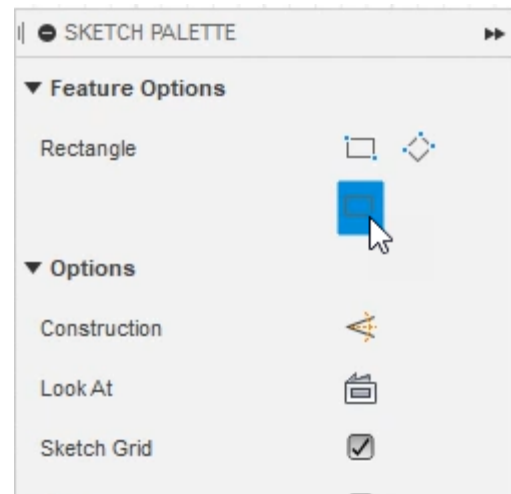
5. Choose the right plane or the YZ plane from the icon in the Canvas. The new sketch will be created on this selected plane and the camera will automatically shift normal to the selected plane.



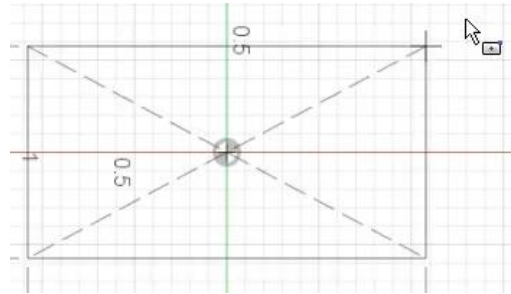
6. Open the Rectangle tool by clicking Create> Rectangle> Center Rectangle.



7. The Sketch Palette control panel has many options for drawing the rectangle. Each of the three different types of rectangle can be chosen in the dialog's Rectangle section. Explore the options in the dialog but don't make any changes.



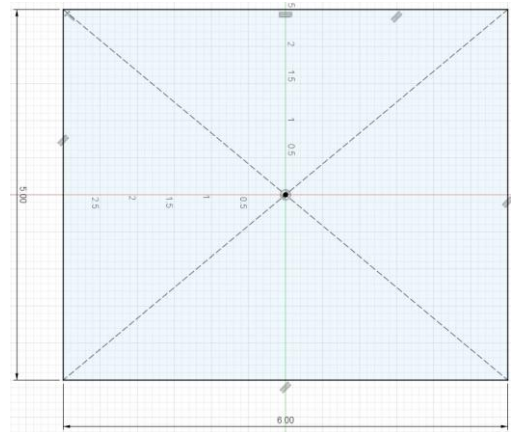
8. Click to place the rectangle's center point at the sketch origin, then drag the cursor outwards. Notice that dimensions are automatically displayed and updated as you drag the cursor.



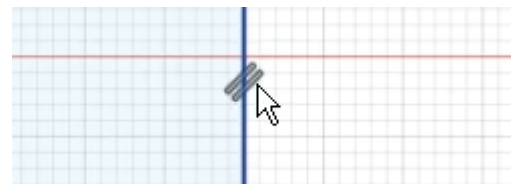
9. One of the dimension fields is automatically highlighted. Press 5 to enter a dimension of 5 into the value field. Press Tab to advance to the next value field. Enter a value of 6 into the second value field and press Enter to accept the dimensions.



10. The rectangle's geometry is finalized and turns black to indicate that it is fully defined.



11. Notice that the rectangle's sides have some icons. These icons represent constraints. The constraint in the image on the right is a parallel constraint indicating that this edge is parallel with the rectangle's other vertical edge. The rectangle should also have horizontal, coincident, and perpendicular constraints applied. Explore these constraints.



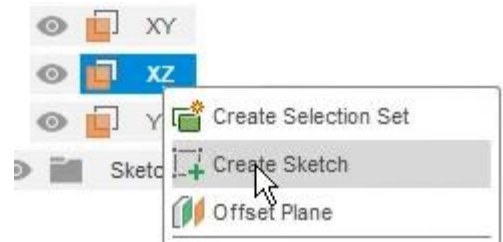
12. Complete the sketch by clicking Finish Sketch > Finish Sketch in the Toolbar.



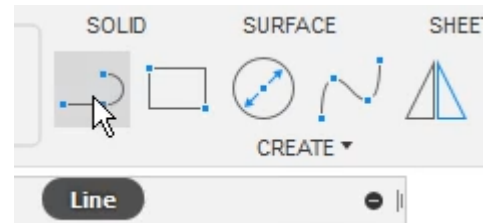
13. Expand the Browser's Origin folder and select the XZ plane.



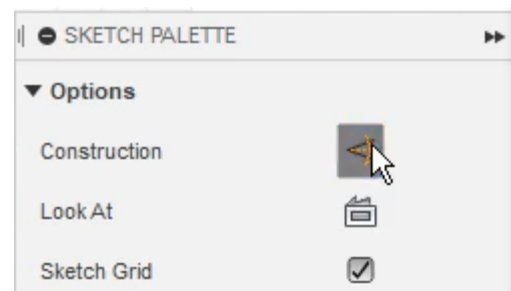
14. Right-click the selected plane and choose the Create Sketch option from the menu. A new sketch is created on the XZ plane.



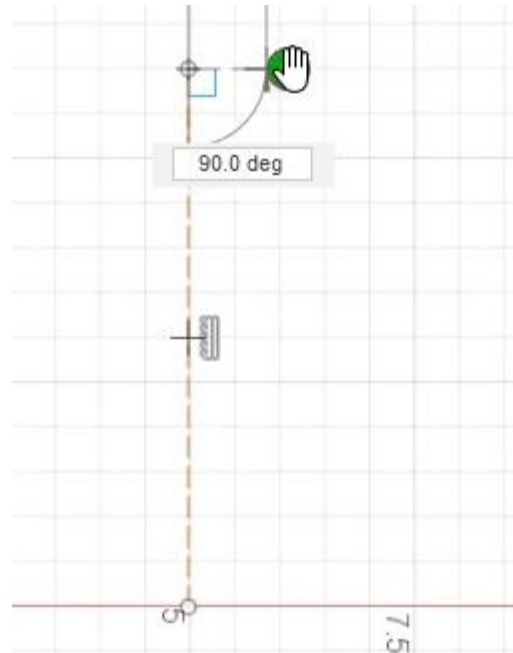
15. Open the Line tool by clicking Create> Line or press L to use the keyboard shortcut.



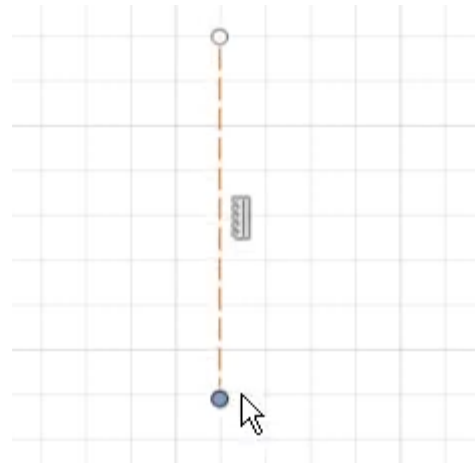
16. Activate the Construction option in the Sketch Palette dialog to make sure that the new lines are created as construction geometry.



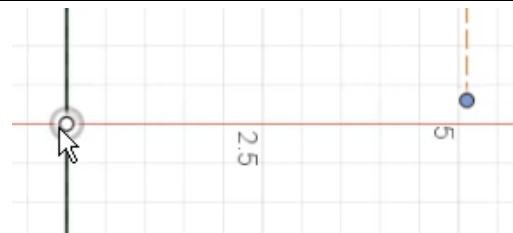
- 17.** Draw a vertical line to the right of the sketch origin by clicking once to begin the line, dragging the cursor, and clicking a second time to end the line. Click the green check icon to end the line but leave the Line tool open. Notice the line has a dashed appearance to indicate that it is a construction line. Press Esc to end the Line tool.



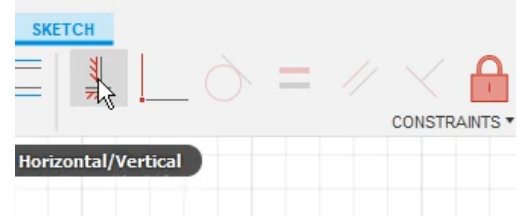
- 18.** Deactivate the Construction option in the Sketch Palette dialog. Click one of the line's endpoints and drag it to a new location in the Canvas. Notice the line is free to move around the Canvas and is not fully defined.



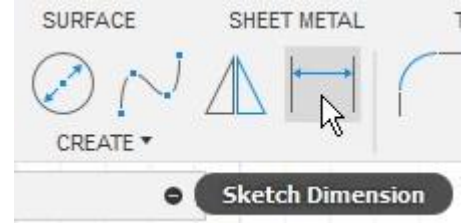
- 19.** Select the line's bottom endpoint, hold Ctrl, then select the sketch origin.



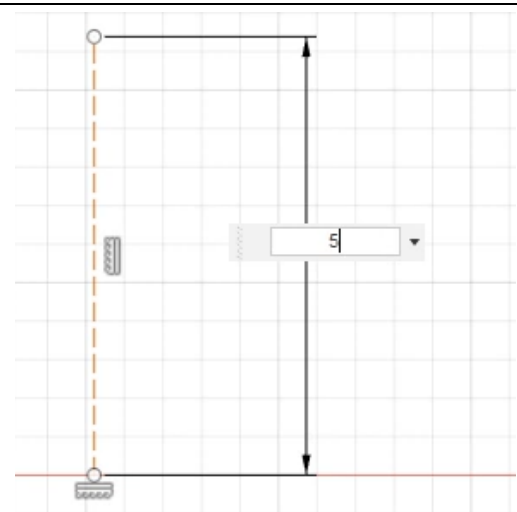
- 20.** Add a horizontal constraint between the two selected items by clicking Constraints> Horizontal/Vertical. A horizontal constraint is only applied between the two selected entities and they can no longer move to any position that is not horizontal with each other.



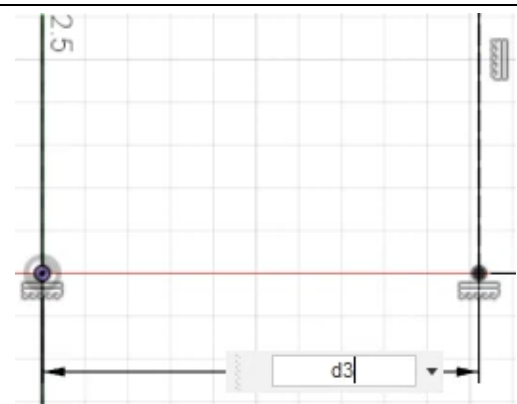
- 21.** Dimensions can be added to a sketch by clicking Create> Sketch Dimension.



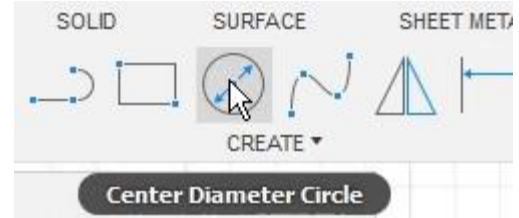
- 22.** Select the vertical construction line and drag the cursor to the right. Enter a value of **5** into the value field, then press Enter . The vertical line is now 5 inches tall.



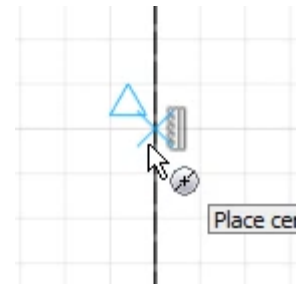
- 23.** Select the sketch origin and the vertical construction line. Instead of entering a numeric dimension, click on the vertical construction line's 5 inch dimension to enter that value into the new value field. Press Enter to accept the new value. Notice the new dimension has an fx prefix to indicate that its value is linked to a parameter.



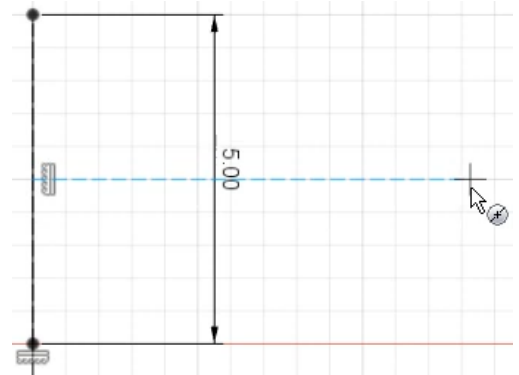
24. Open the Circle tool by clicking Create> Center Diameter Circle.



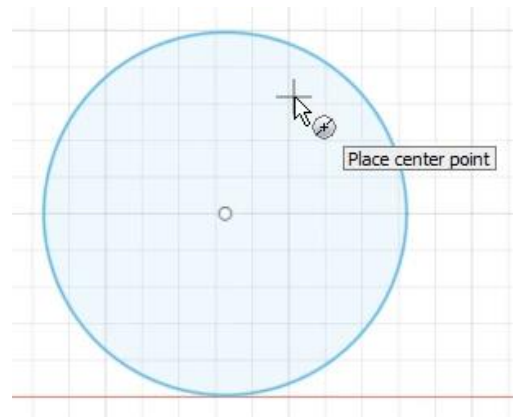
25. Move your cursor near the vertical construction line's middle and notice that a triangle icon appears. This icon indicates the geometry's midpoint.



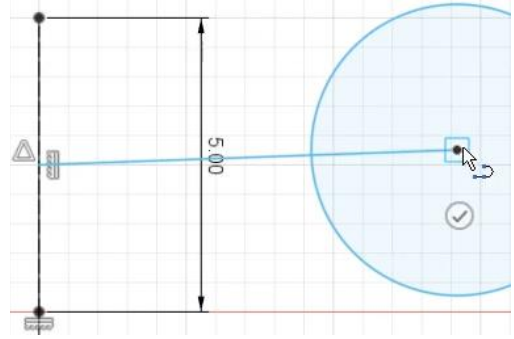
26. After finding the vertical line's midpoint, drag the cursor to the right and notice that a dashed line helps indicate a location horizontal to the midpoint.



27. Click to place the circle's center point horizontal to the vertical line's midpoint, then drag the cursor outwards and click a second time to place the circle's diameter. The circle's geometry is blue to indicate that it is not yet fully defined; the circle is free to move around the Canvas. Press Esc to leave the Circle tool.



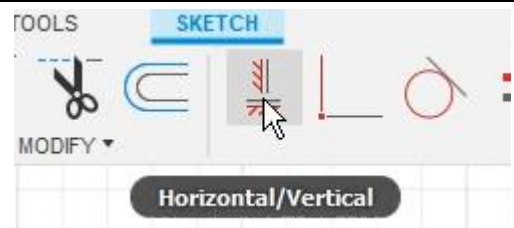
- 28.** Press L to open the Line tool. Begin the new line at the vertical construction line's midpoint, then end the line at the circle's origin.



- 29.** Click the green checkmark to end the current line.



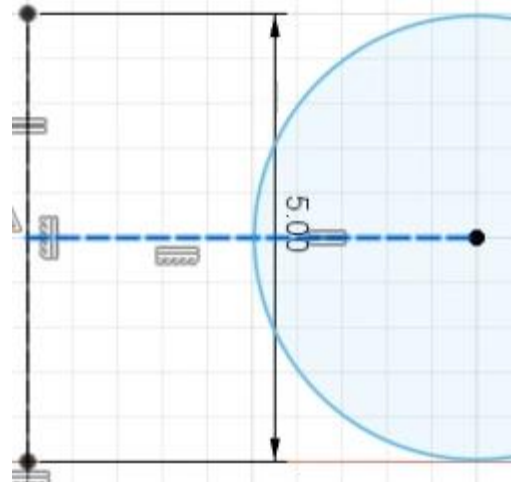
- 30.** Select the new line you just drew, then click Constraints> Horizontal/Vertical. The new line will snap to a horizontal position.



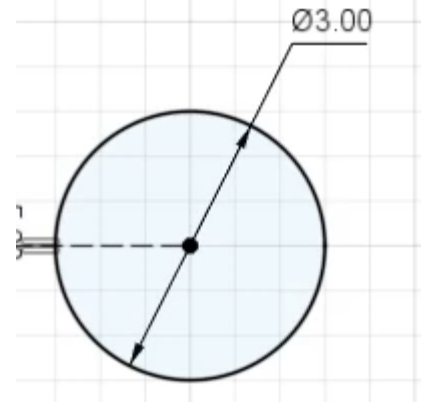
- 31.** Select the new line and the vertical construction line, then click Constraints> Equal. The new line now has a length of 5 inches even though no dimension is added to the line. Press Esc to leave the Equal constraint tool.



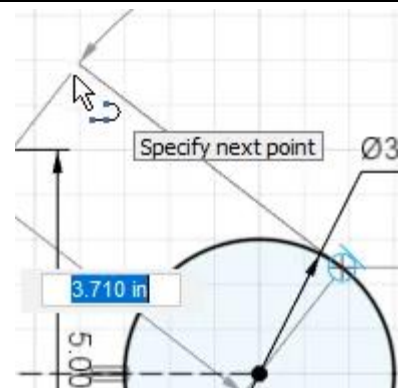
32. Select the new horizontal line and activate the Construction option in the dialog. The line's appearance turns from solid to dashed to indicate that it is now construction geometry.



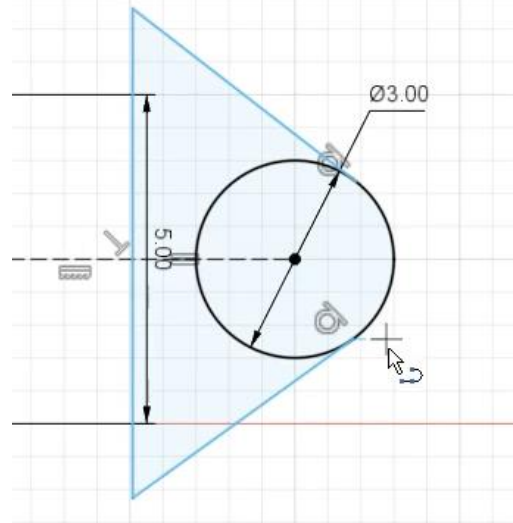
33. Click Create> Sketch Dimension or press D to use the keyboard shortcut. Select the circle's perimeter and add a 3 inch value for the circle's diameter. Press Esc to leave the Dimension tool.



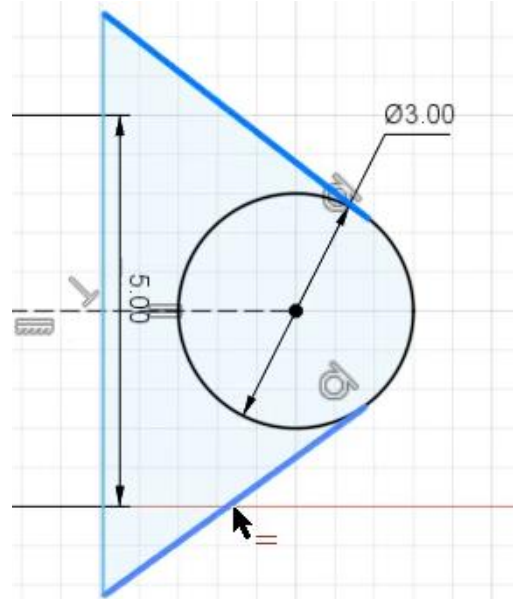
34. Press L to open the Line tool. Click on the circle's perimeter to begin the line, then drag the cursor up and to the left. Notice that the line snaps to specific angles as you approach them. The line is attempting to make itself tangential to the circle's perimeter. This is called a persistent constraint. To override the persistent constraints, hold down Ctrl while modeling the geometry.



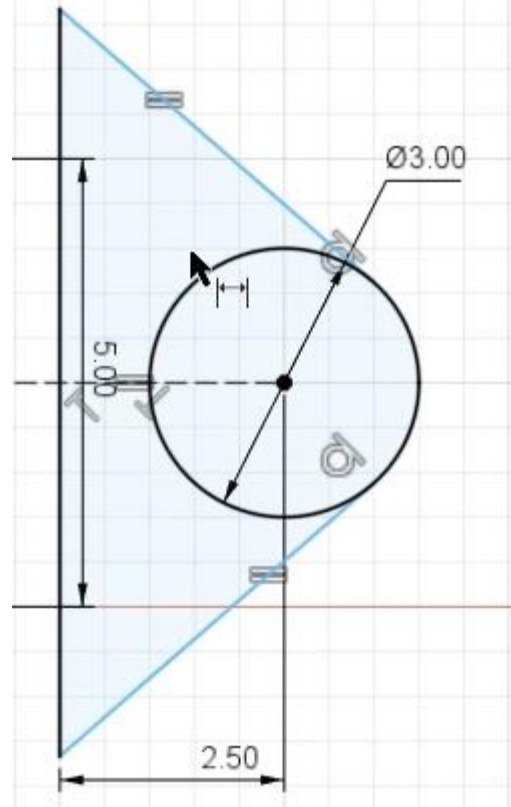
- 35.** Draw three lines to add to the circle's geometry. Allow the two lines that touch the circle's perimeter to add the tangent persistent constraints.



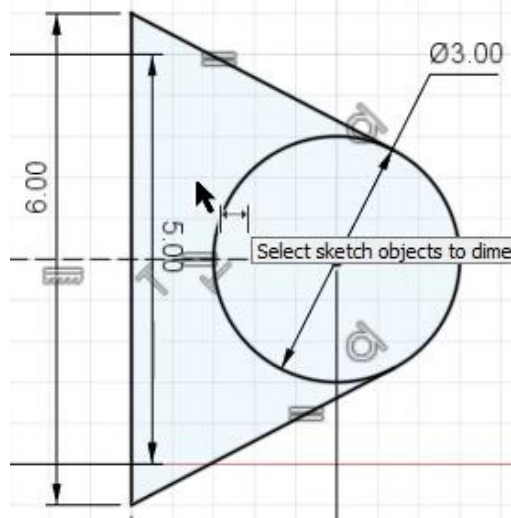
- 36.** Click Constraints> Equal and add an equal constraint between the two diagonal lines. Press Esc to leave the Equal constraint tool.



37. Press D to open the Dimension tool and add a dimension between the new vertical line and the circle's origin. The line's position is fixed but its length is not.



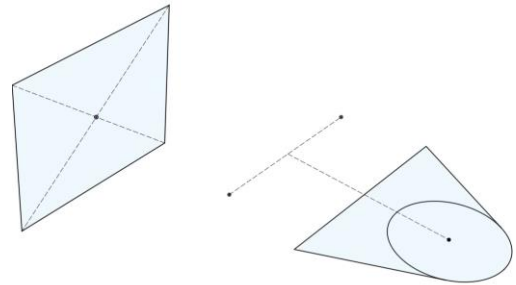
38. Add a dimension of 6 inches to the vertical line and notice that all of the geometry is now fully defined.



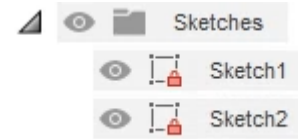
39. Click Finish Sketch> Finish Sketch to accept the geometry and exit the sketch.



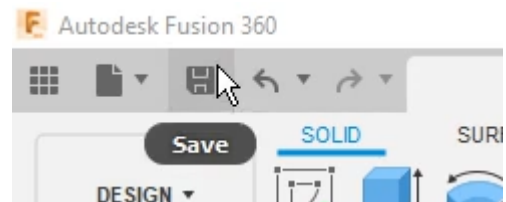
40. The camera repositions itself to show the sketched geometry.



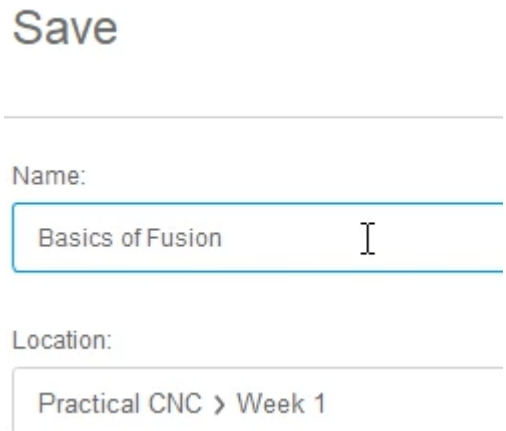
41. Expand the Browser's Sketches folder and notice that the sketches have a red lock icon next to them. These icons indicate that the sketches' geometries are fully defined.



42. Save the file.



43. Name the file **Basics of Fusion**, then click Save inside the Save dialog.



44. Click Show Data Panel and notice the new design is added inside the current subfolder. Minimize the Data Panel by clicking Hide Data Panel, then continue to the next module.

