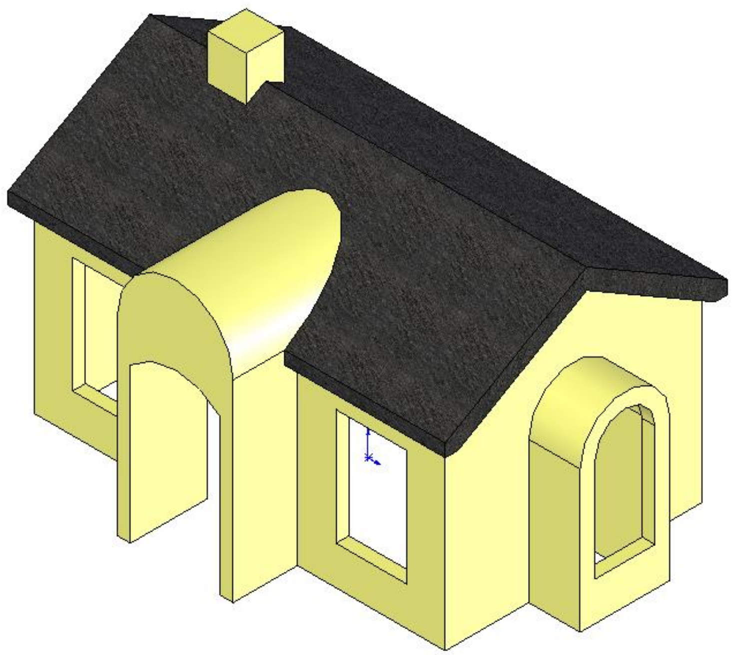
Model House Exercise-(Extrude)



Prerequisite knowledge This lesson requires an understanding of using the sketch commands including

- Inserting a new sketch
- Adding sketch geometry
- Understanding the state of the sketch
- Smart Dimension, Trim, Mirror and Shell

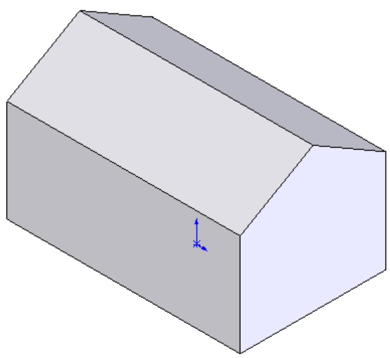
Focus of the lesson This exercise will develop your ability to,

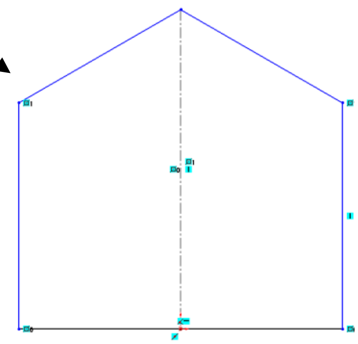
- select the best profile (the one, when extruded, will generate more of the model than any other)
- select the best plane on which to place the sketch
- select the best end condition when using the extrude command

Commands Used On completion of this lesson you will have used ***Sketch, Mirror, Trim, Extruded Boss/Base, Shell and Extruded Cut***

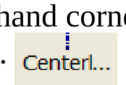
Getting Started

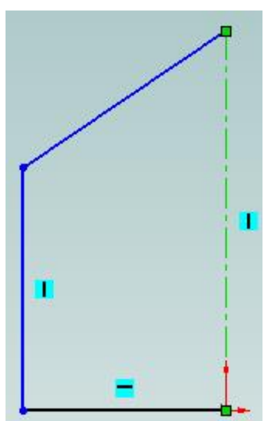
When the geometry of this Model House is analysed, it becomes apparent that the main body and roof can be extruded from the right plane, the front entrance off the front plane and the chimney off the top plane.
The first feature of the part to be created is the body of the house. This will be an extruded feature based on a sketch.





Create a sketch on the right plane similar to the following one. Position the sketch so that the origin is in the lower right hand corner. Note that the line on the right is drawn using the ***centerline*** command.

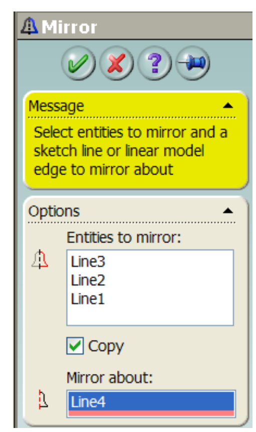


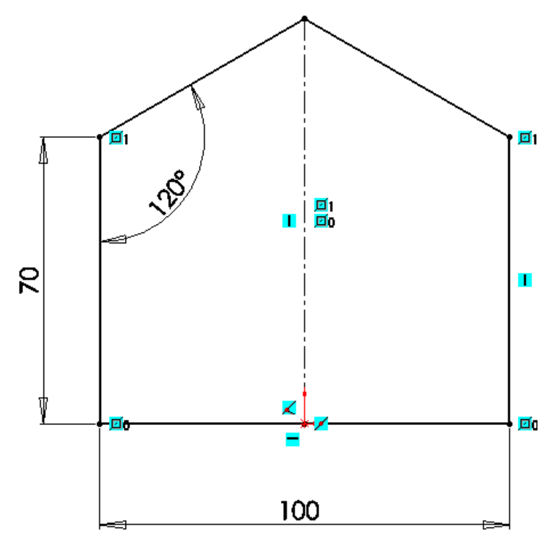


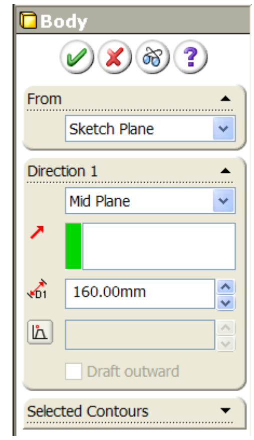
Using **Mirror Entities**, select the lines to be mirrored and the centre line about which they are mirrored.

Choose OK

Smart dimension the sketch as shown.





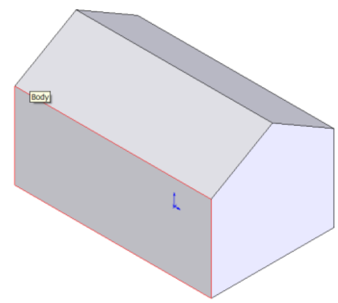


Creating the feature

Select **Extruded Boss/Base.** Select the **Mid Plane** end condition from the list and enter a width of 160mm.

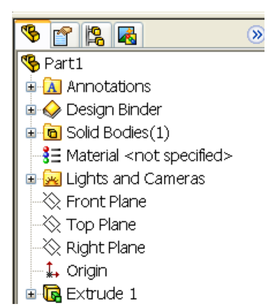
Choose **OK** 

The **Mid Plane** option is the most appropriate in this exercise as it can be used to create the body, the roof and protruding side windows from a single sketch plane.

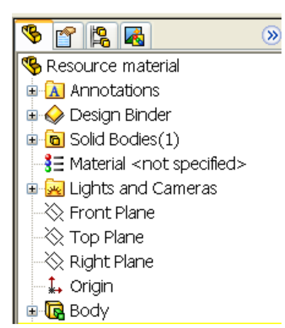


Renaming the Feature

Select the name of the feature (Extrude 1). Press F2 On the keyboard and type the new name of the feature (Body)

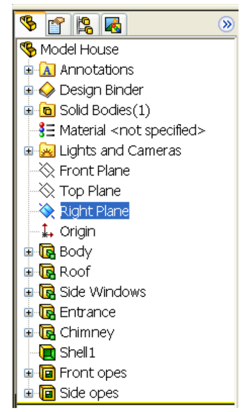


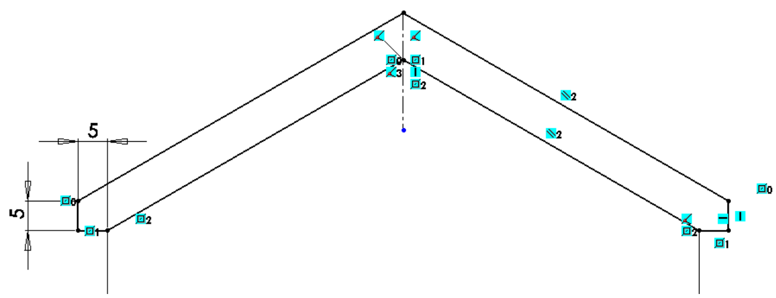
This allows us to rename each completed feature which makes it easier to identify/ edit different parts on a completed part drawing.

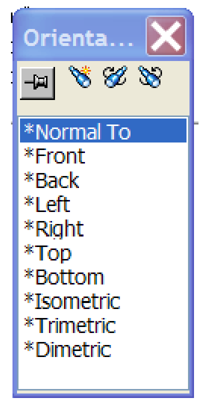


Roofing the house

Select the Right Plane from the **Feature Manager Design Tree**. View **Normal To** and create a **sketch** using dimensions shown. Note the location of the sketch in relation to the top of the previous one.

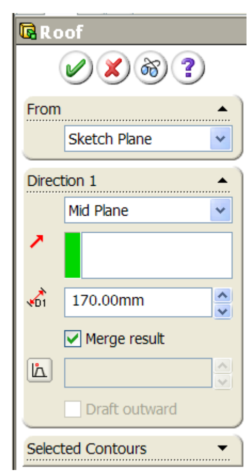




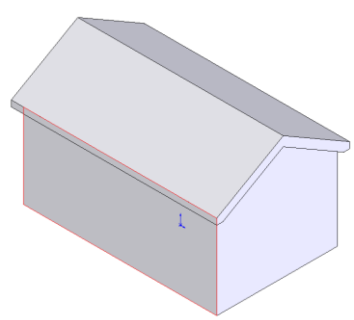


Creating the feature

Select **Extruded Boss/Base**. Select the **Mid Plane** end condition from the list and enter a width of 170mm.

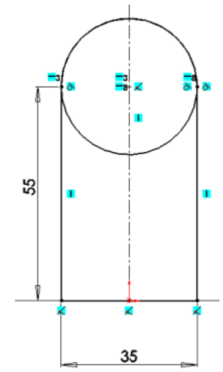


Choose **OK**  and rename the feature. (Body)



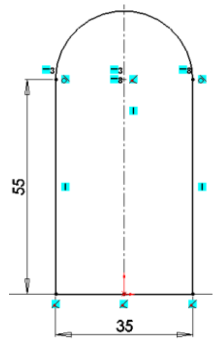
Note the manner in which this gives an overhang of 5mm on each side.

Side Windows



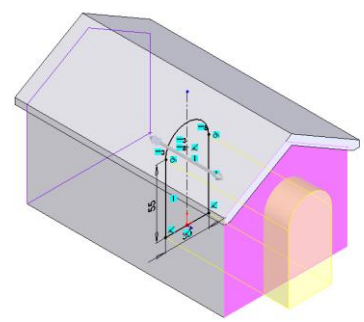
Create a sketch on the right plane using the dimensions shown. Note the location of the origin.

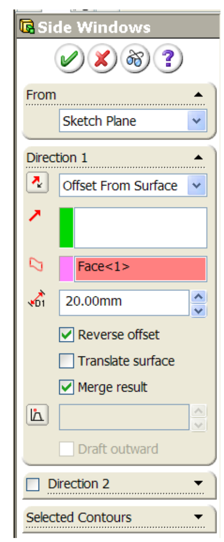
Use **Trim Entities** to remove the lower half of the circle.



Creating the feature

Select **Extrude Boss/Base.**
Select **Offset From surface.**
Select the face you want to offset from and enter a distance of 20mm**.**
Use the **Reverse Offset** to ensure the offset is in the correct direction.





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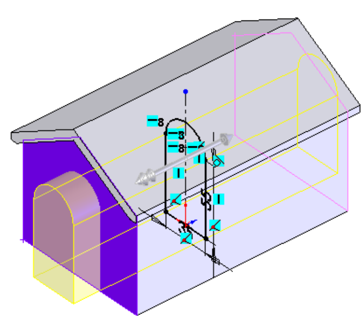
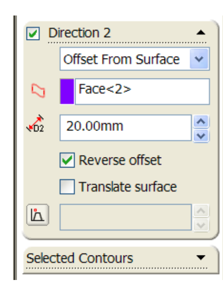
The **Offset From Surface** command ensures that if the length of the house is changed the offset remains at 20mm.

Select the **Direction 2** box to expand the window.
Select the second face you want to offset from and enter a value of 20mm.
Use the **Reverse Direction** to ensure the offset is in the correct direction.

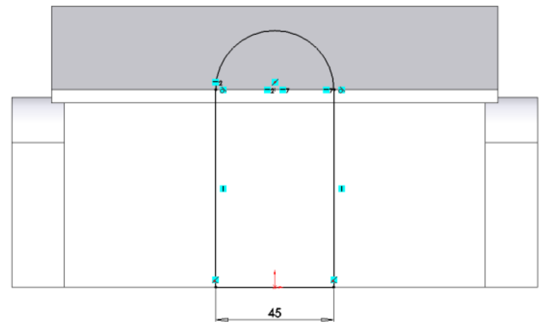




Choose OK and rename the feature. (Side Windows)

Front Entrance

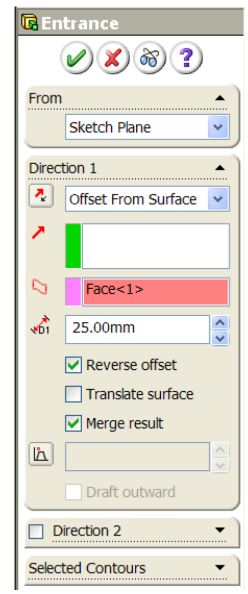
Create a **sketch** on the front plane using the dimensions shown. Note the location of the origin in the centre of the base and how the centre of the semi-circle has the same altitude as the base edge of the roof.

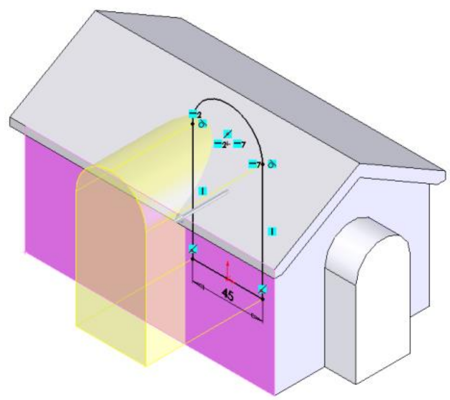


Creating the feature

Using **Extrude Boss/Base** and **Offset From Surface** as in the previous page, set the distance at 25mm to create the feature.

Choose OK and rename the feature. (Entrance)

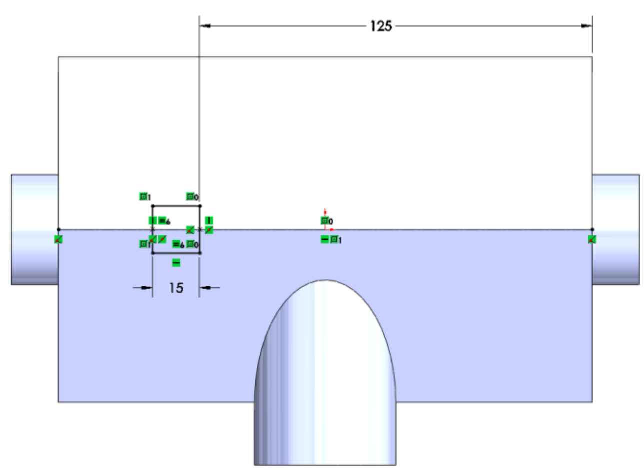




Chimney

Create a sketch on the top plane using the dimensions shown. The centre of the square is on the ridge line of the roof.

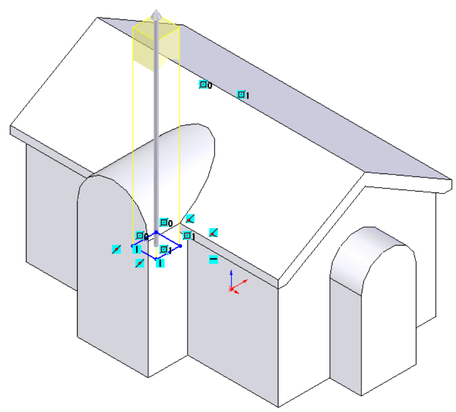
(Using Mirror Entities as outlined on page 2 is one option in creating this sketch.)

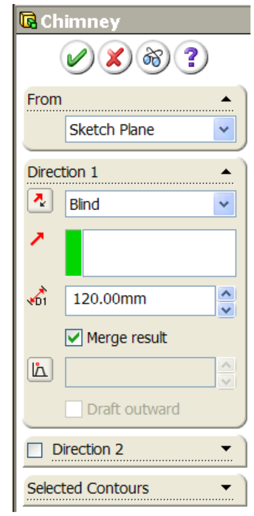


Creating the feature

Using **Extrude Boss/Base** and the **Blind** end condition, set the distance at 120mm.

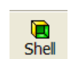
Choose OK and rename the feature. (Chimney)





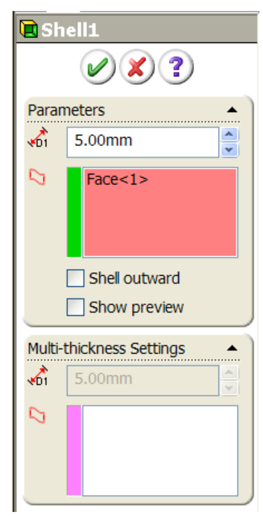
Changing the altitude of the house will require a similar change in this feature to maintain the overall appearance.
Future lessons will deal with the use of inserted sketch planes and how they can help overcome this problem.

Creating the shell

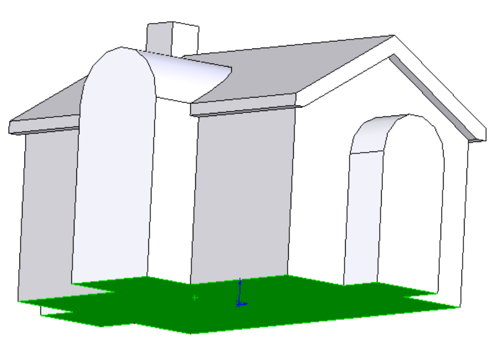
On the features toolbar click the 

shell tool.

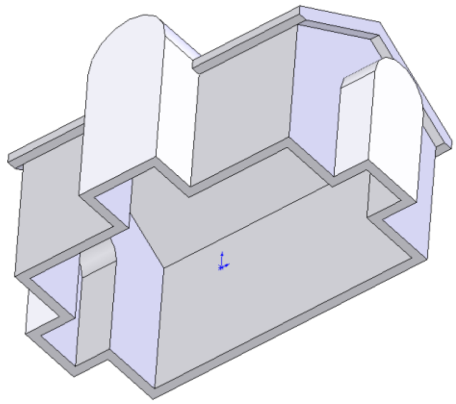
Select the base of the house and set the distance at 5mm. (To select the base we need to see it. To achieve this, hold down the mouse wheel and move the mouse to rotate the drawing)



Choose OK and rename the feature. (Shell)

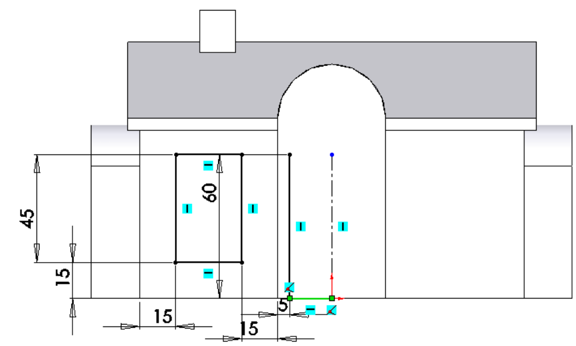


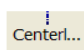
This completes the shell with a 5mm wall thickness.



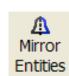
Windows and Doors

Create a sketch on the front plane using the dimensions shown.

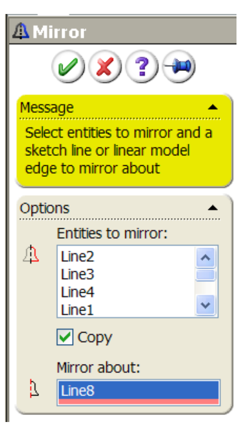


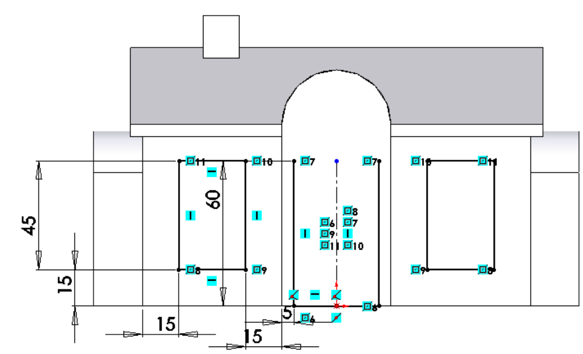
Select the plane and view **normal to** as previously outlined…….note the use of centerline 

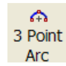
command as used in page 2.

Using Mirror Entities 

from the features toolbar, create the right hand side of the sketch.

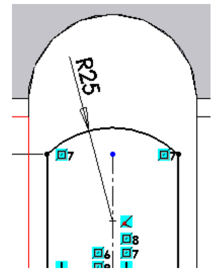




Use the **3 point arc** 

from the **sketch** toolbar to complete the sketch using the dimensions shown.

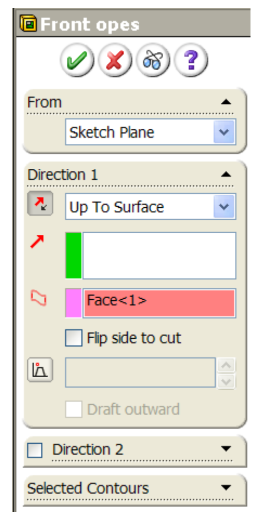
To create the arc, select one end, select the other end and then select the approximate location of the top of the curve.

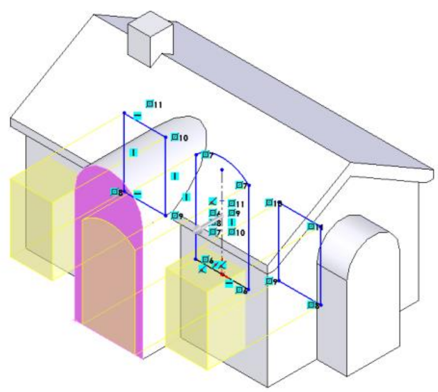


Creating the feature

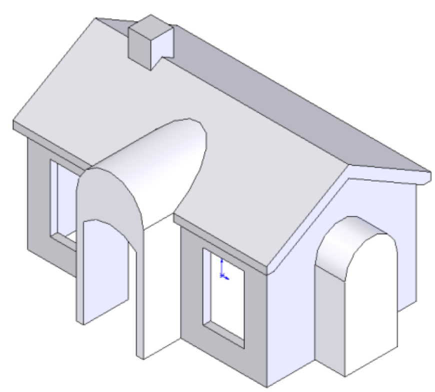
Select **Extrude Cut** from the features toolbar. Select the **Up To Surface** end condition and the front face of the entrance as the chosen surface.

Choose OK and rename the feature. (Front opes)

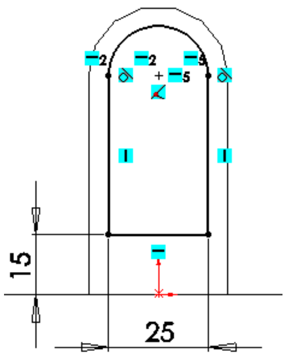




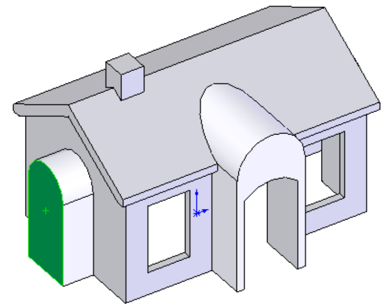
Using the **Up To Surface** end condition ensures that any changes in the width of the house will not change these openings.



Side Windows

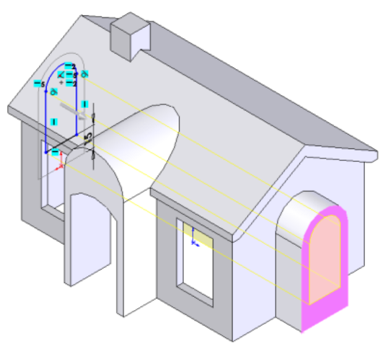


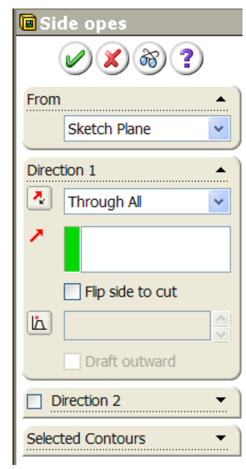
Create a sketch on the selected plane using the dimensions shown.
Note the concentric circles.



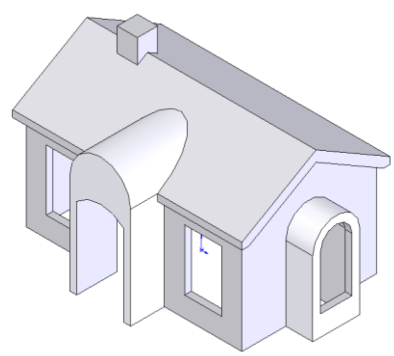
Creating the feature

Select **Extrude cut** from the features toolbar and use the **Through All** end condition.





Choose OK  and rename the feature.
(Side opes)

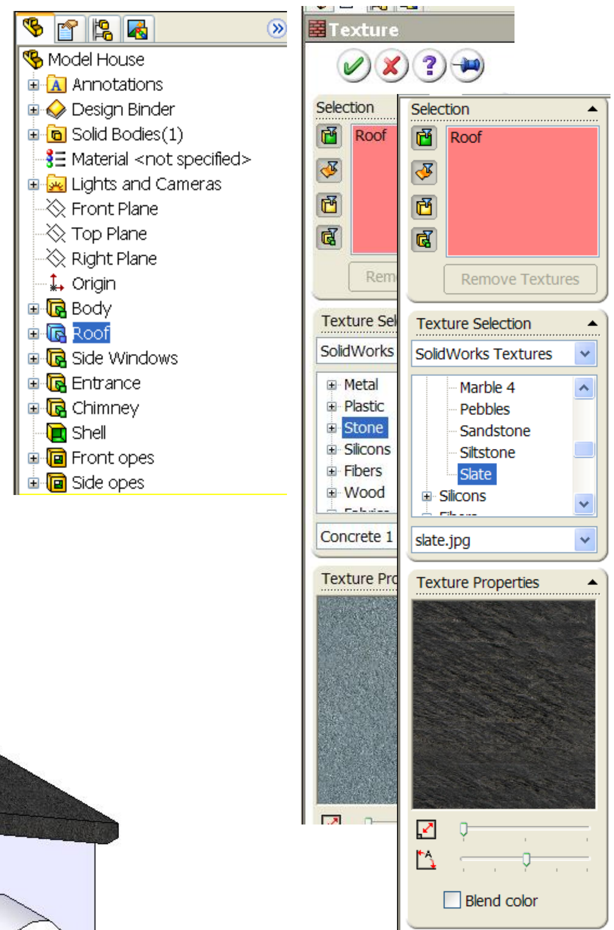


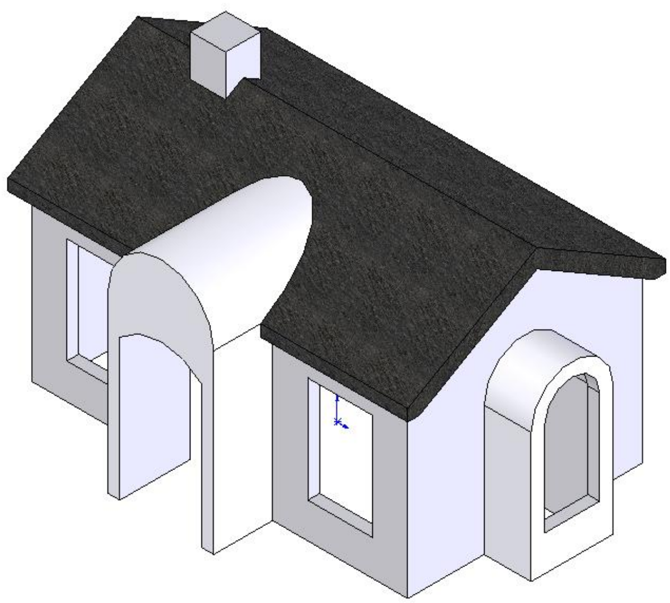
Using the Through All end condition ensures that any change in the width of the house will not change these openings.

Edit Material

Right click on Roof in the **Feature Manager Design Tree,** select **Appearance, Texture……..** Select **Stone…..Slate**

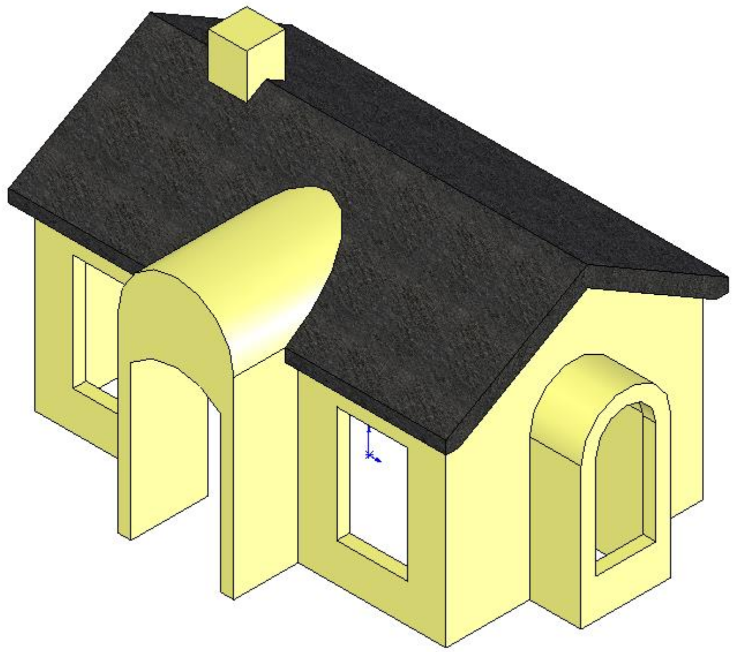
Choose OK 



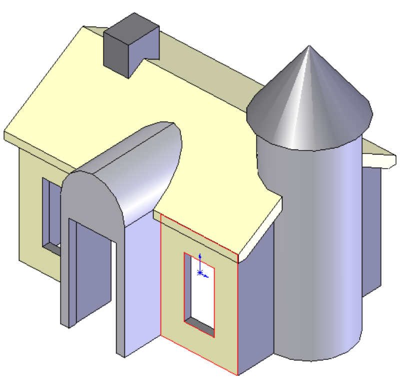


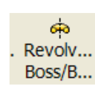
Edit Colour

Right click on Body, Side Windows, Entrance etc. in the **Feature Manager Design Tree ,** select **Appearance, Colour…….**and select a colour to make the model look more realistic as shown on the front page of the document.



Alternative Option



In this case **Revolve Boss/Base** 

can be selected from the **Features** toolbar to create the tower.

Lofted Boss/Base 

can also be used to create the Conical top surface.

Lesson Complete !