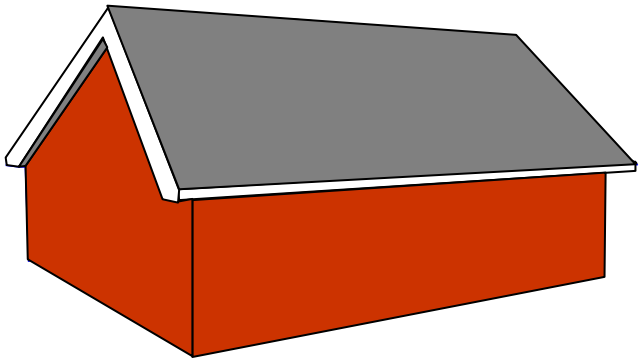
Traditional cut roof with Hip & Valley

Aim: To develop an understanding of the aspects to a traditional cut roof

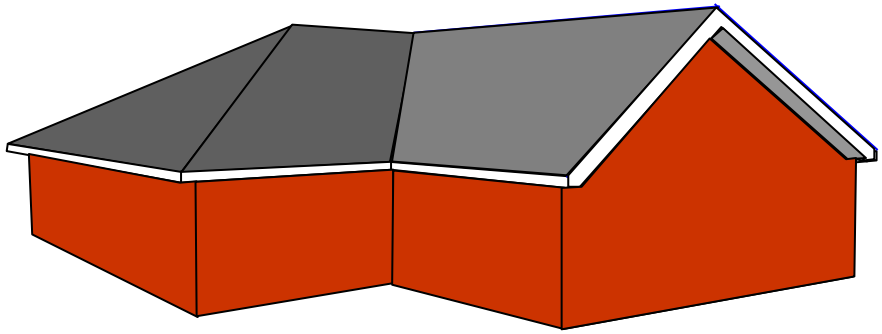
Objectives: By the end of the session you will be able to:

- Identify the main components in a hip and valley roof
- Develop the surfaces of a hip roof
- Determine the length of a Common Rafter

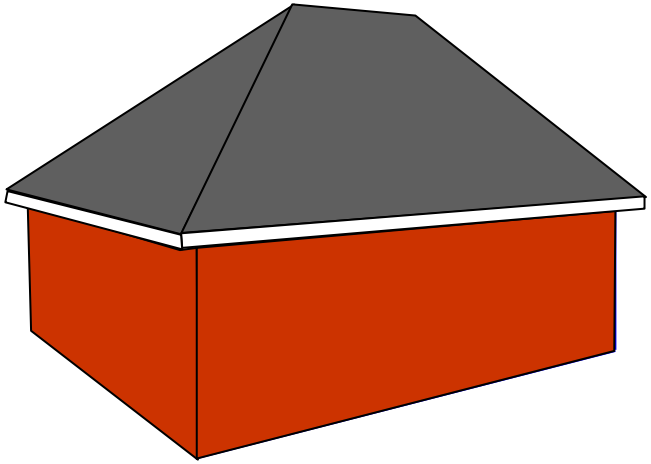
Types of roof



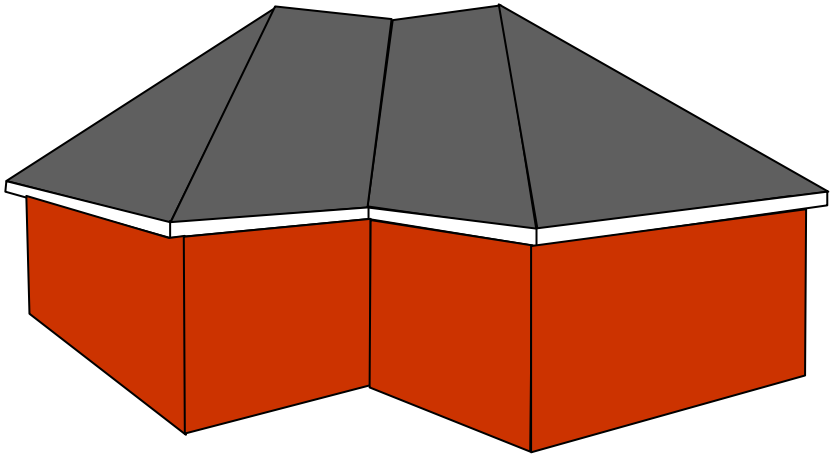
Gable Roof



Hip & Valley with Gable End

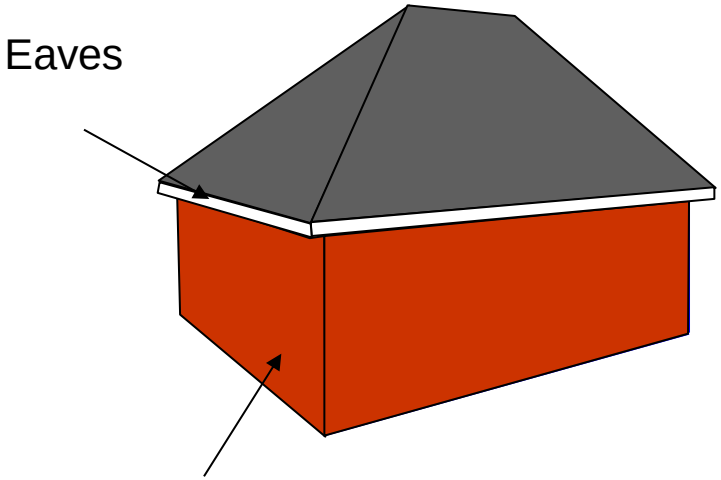


Hipped Roof

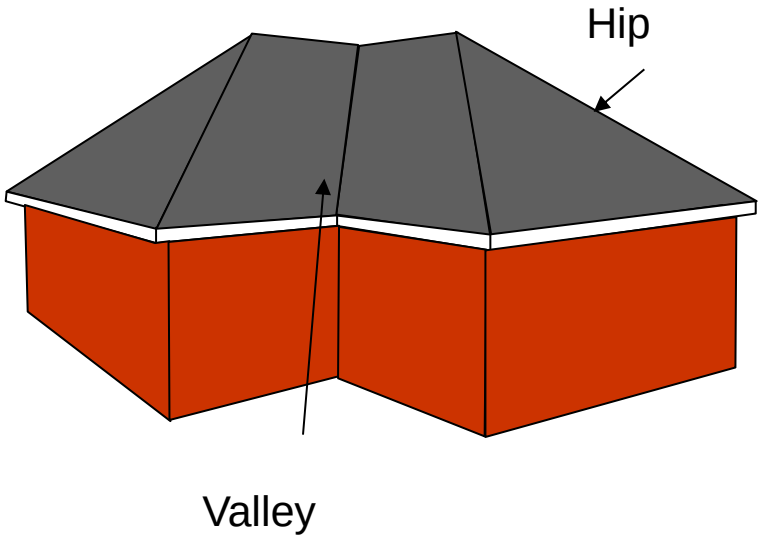


Hip & Valley Roof

The Hipped Roof

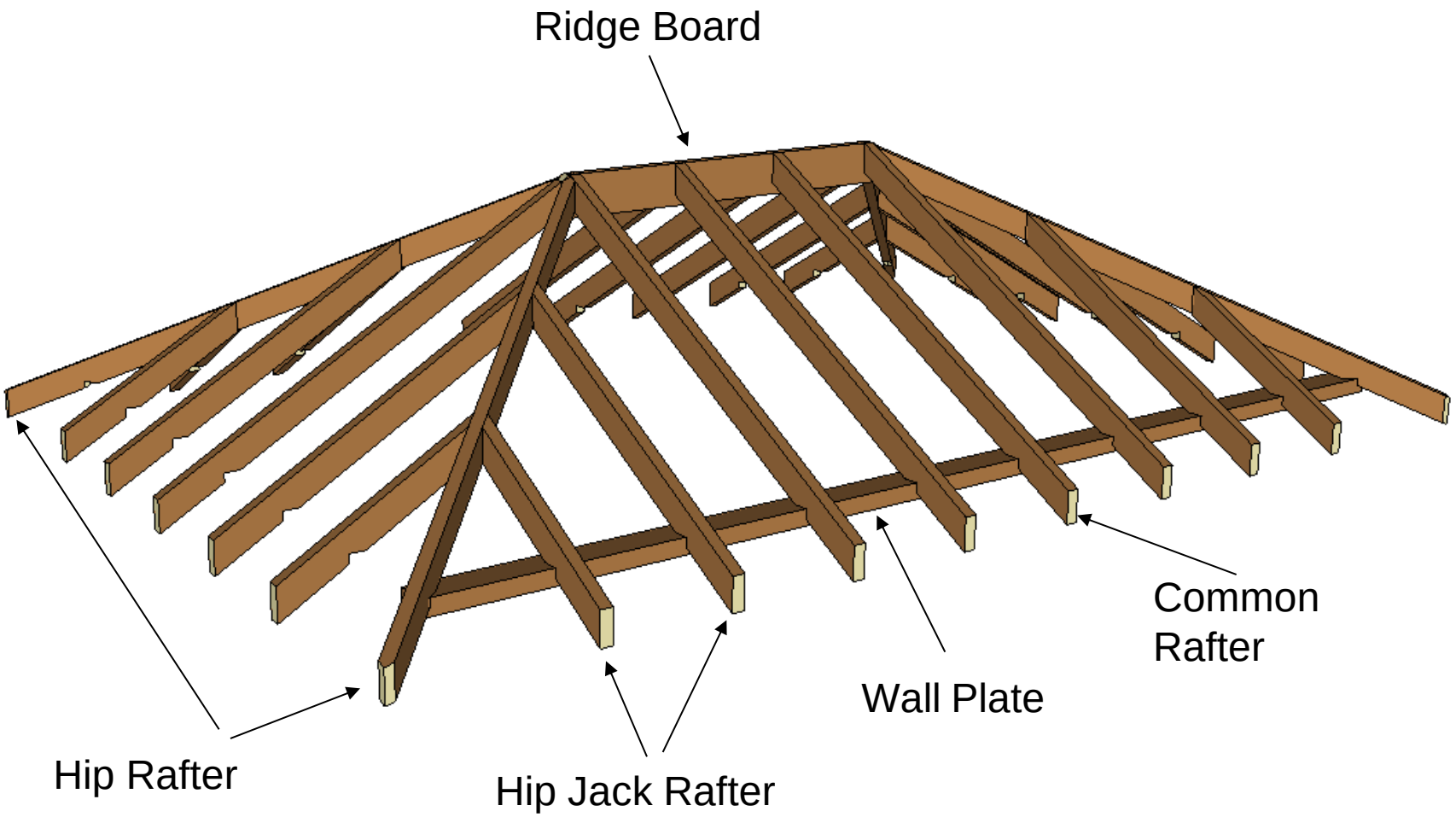


Unlike the gable roof the end walls with a hipped roof finish at the eaves and above this the roof is sloped to meet up with the other inclined roof surfaces.



When the surfaces on this roof meet they create a hip on the external corners and a valley on the internal.

The Hipped Roof components



The Hipped Roof components

Ridge Board: This component is used to affix the plumb cuts of the common, hip and valley rafters.

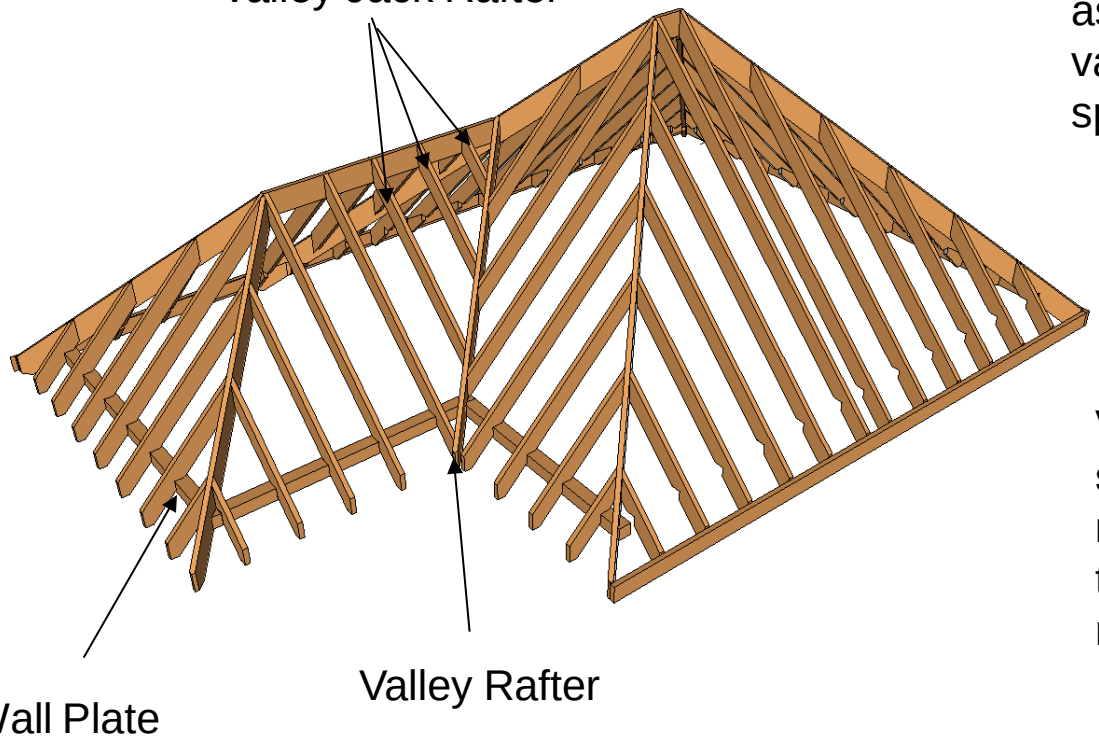
Wallplate: Provides a fixing for rafters and ceiling joists and distributes the roof load. The span of the roof is normally from the two outside edges of the plate.

Common Rafter: Sometimes called a ‘spar’ and spans from wallplate to ridge board.

Hip Rafter: Forms a spine at the corner of the roof and are used to interconnect shorter rafters called hip jack rafters to the wallplate.

Hip Jack Rafter: Used to fill the void from the last common rafter to the end of the hip rafter

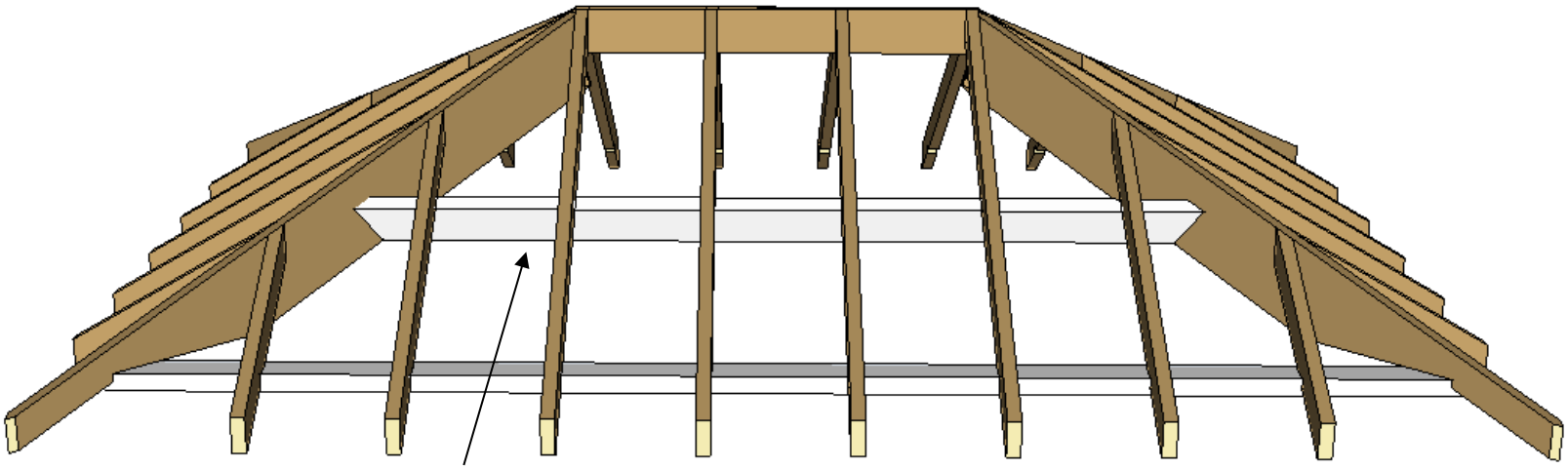
The Hip and Valley Roof components



Valley Rafter: This has a similar interconnecting purpose as the hip rafter but for hip valley jack rafters. It forms a spine at an internal corner

Valley Jack Rafter: Has the same purpose as the ‘hip jack rafter’ but fill the void between the ridge board and the valley rafter

The Hip and Valley Roof components



Purlin

Purlin: This components is used on hipped rooves as well as those with gable ends. Its purpose is to support rafters approximately half way up and with the addition of struts transfer the load of the roof to internal walls. The purlin is built into the brickwork on gable end rooves but with hip and valley construction it is attached to the hip and valley rafters with a compound bevel. The use of a purlin creates a ‘double roof’.

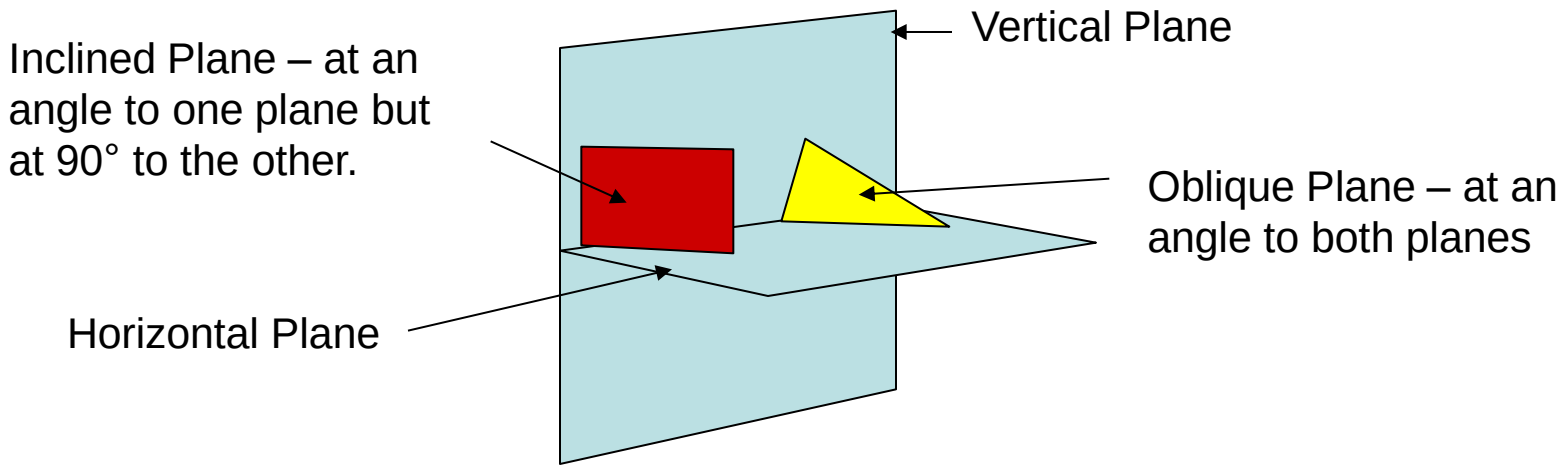
Roof Geometry

Development

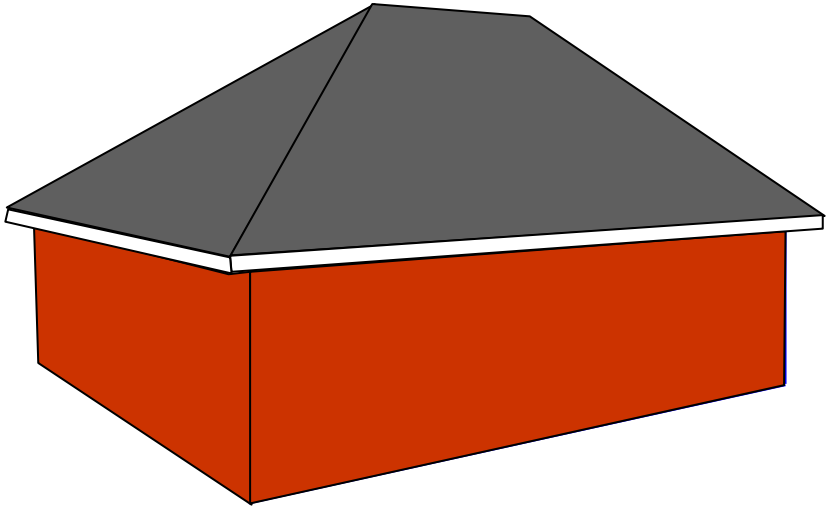
To draw the development of an object means to draw the shape of all its surfaces laid out flat in one plane. The development when bent along certain lines will form the shape of the object.

Planes

Planes are two dimensional flat surfaces, typically a horizontal plane or vertical plane. However we can have objects which are inclined (at an angle) to these planes and this happens in many instances on a hipped roof.



Roof Geometry



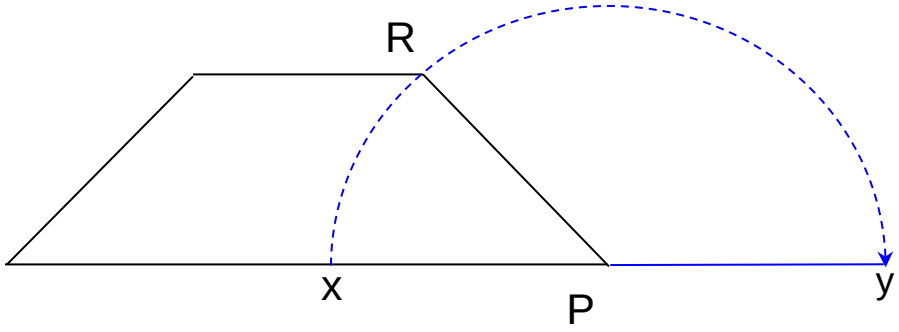
Hipped Roof

Task: Using your drawing board and equipment follow the instructions on the next two slides and develop the surfaces of a hipped roof.

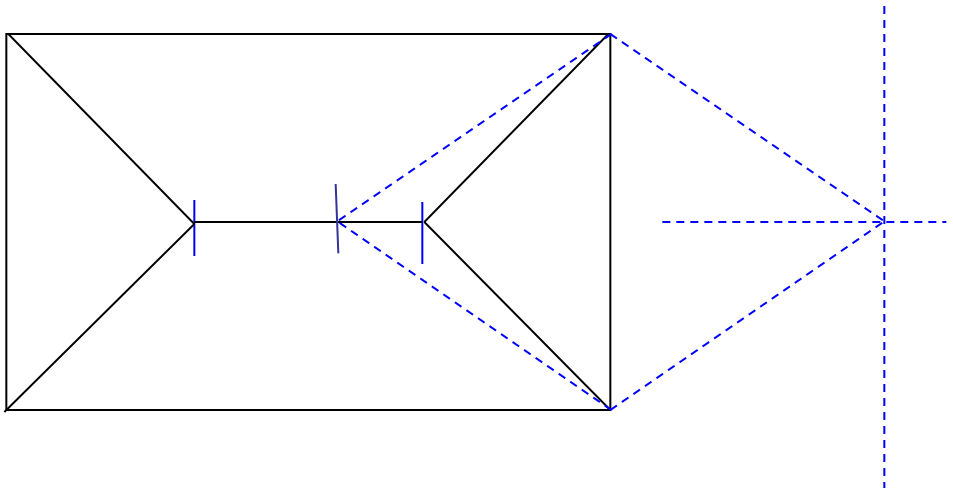
Make the model from cardboard and note an differences.

Extension Exercise: If you finish quickly use the instructions for further geometry on how to erect a perpendicular and bisect an angle

Basic Development of Surfaces on a Hip Roof



Front Elevation



Plan

1. Draw the front elevation of the roof – 40mm rise, pitch of 45° and 100mm long

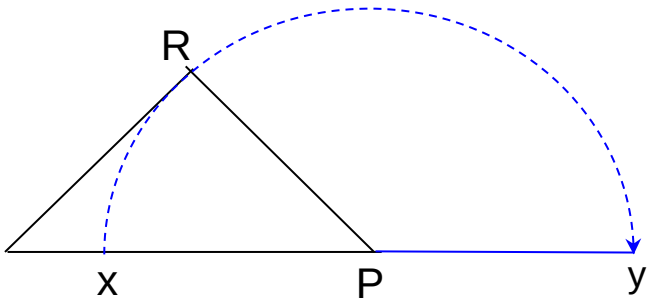
2. Transfer lines down to produce the plan and make the width of the roof – 80mm.

3. Use a pair of compasses with radius PR and centre P, described arcs at x and y.

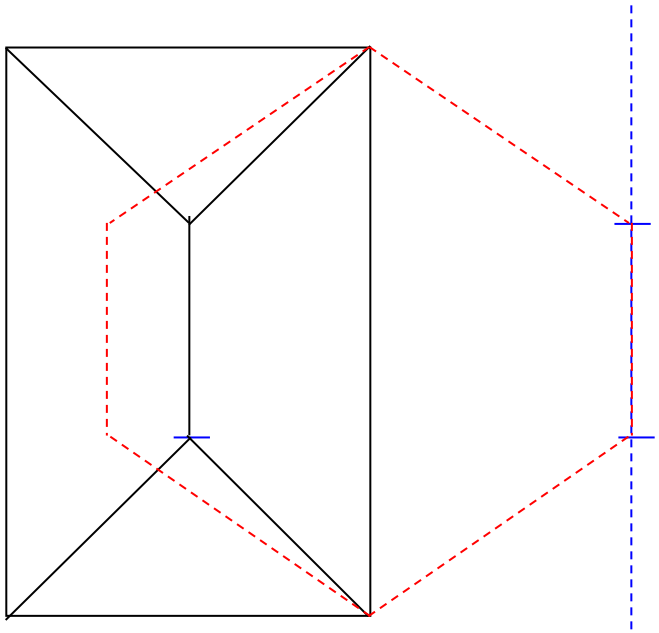
4. Transfer lines down to meet centre lines of roof and join up the points to give the true shape for the end surfaces of the roof.

5. Repeat for the end elevation of the roof

Basic Development of Surfaces on a Hip Roof



End Elevation

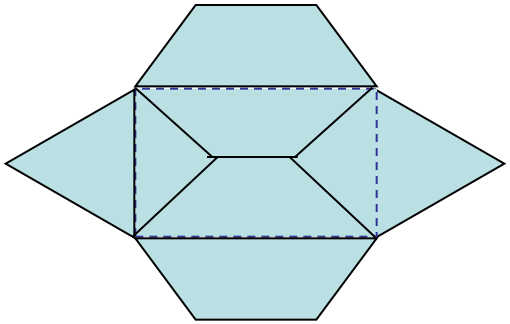


Plan

1. Repeat the drawing steps from the previous page on the front elevation

2. When complete transfer the measurements of your plan and developed surfaces onto the piece of card supplied.

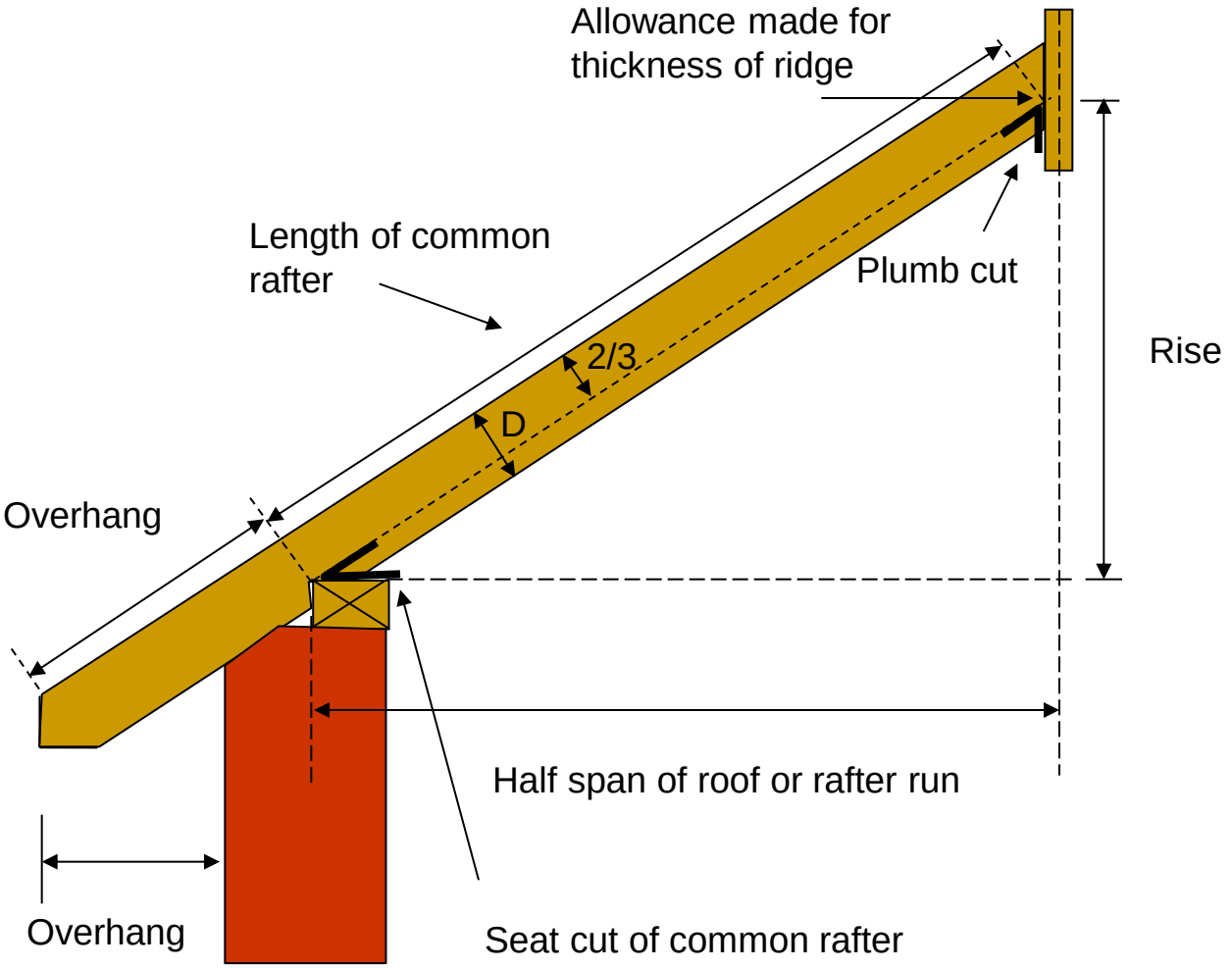
3. State the two differences you notice with the developed surfaces.



Cut out your shape and fold along the dotted lines – use cellotape to hold it together

What is the angle called at the corner?

Determine the length of the Common Rafter



Task: Using the guidance diagram to the left determine the length of the common rafter in a roof with a span of 4m and a rise of 1.2m.

Use your drawing board and equipment and a suitable scale, (1:10)