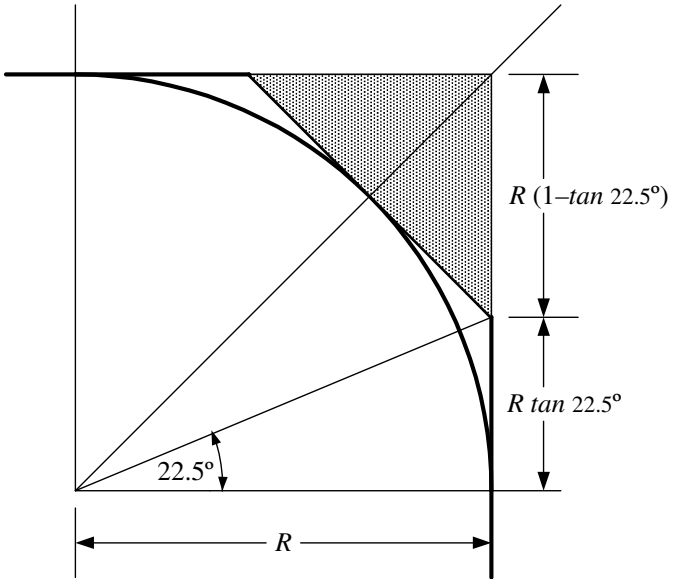
Developing a Quarter Round

Creating a quarter round with hand tools such as a chisel or plane without a method is guesswork. Here we explain a method for laying out a series of flat surfaces tangent to the desired quarter circle which permits the desired radius be accurately formed along straights as well as curved edges such as found on oval tables and cabriolet legs.

Consider the quarter round geometry shown at the right. Clearly, the edges of the board form two flats tangent to the circle of radius *R*. The next step is to lay out the location of the 45º tangent flat to permit removal of the shaded waste area. We will then have three flats which bound the desired radius.



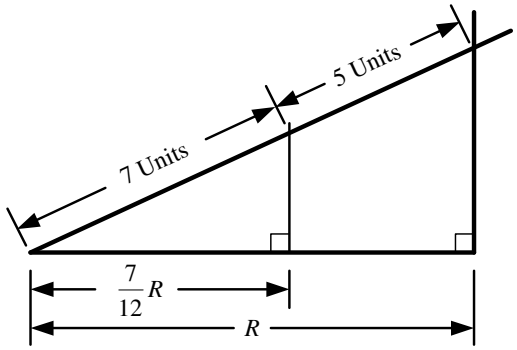
The edges of the 45º tangent flat intersect the edges of the board at the locations shown in the diagram at the right. If the distance $R\,(1-\tan 22.5^\circ)$ is laid out in both directions from the board's corner, they will mark the edge locations of the 45º tangent flat of the original stock, permitting planing or carving the 45º tangent flat by delimiting the removal of the shaded waste material.

However, determining the actual distance $R\,(1-\tan 22.5^\circ)$ by evaluating the trigonometric expression is inconvenient. A more direct method is required. It happens quite serendipitously that

$$1-\tan 22.5^\circ \cong 7/12 \qquad \text{and} \qquad \tan 22.5^\circ \cong 5/12$$

to within about 0.5%. If the radius *R* can be divided into 12 equal parts, then the distance of the 45º tangent flat's edges from the corners is 7 of those parts. For example, if the desired radius is 3/4 inch, that radius divides into 12 parts of 1/16 inch each. This, in turn, means the 45º tangent flat's edges will be 7/16 of an inch in from the corner, and the ends of the quarter round will be located 5/16 of an inch further, at 3/4 inch.. This layout method is sometimes called the *5–7 Rule* since we are laying out a distance from the diagonal corner of 7 parts of the radius to locate the 45º tangent flat's edge and 5 more parts to locate the final edge of the quarter round radius.

Of course, you may have a radius that is not easily divisible by 12. Should that be the case, the construction shown at the right will quickly determine the required 5- and 7-unit distances.

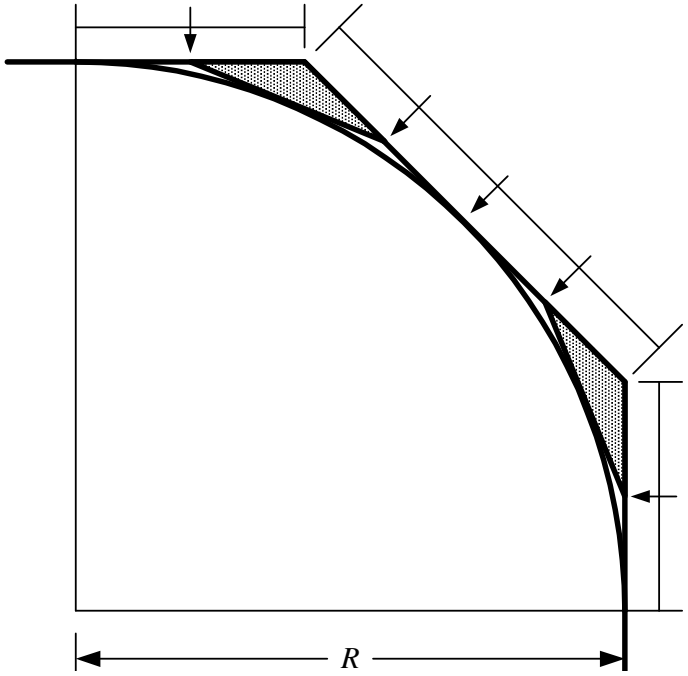


Lay out the desired radius on paper. Erect a perpendicular at the right end. Complete the right triangle by drawing a hypotenuse of 12 convenient units: lengths of 1 ½ , 2 ¼ , 3 inches, etc. Or you can use a metric scale for finer divisions. Measure 7 units up this hypotenuse and drop a perpendicular down to the horizontal radius. This will produce the required 7/12 *R* distance for laying out the 45º tangent's edges.

With the 45º tangent flat's edges now established, plane or pare away the shaded waste to form the 45º tangent flat.

The next step is to strike three lines on the 45º tangent flat to divide it into four equal parts as shown by the arrows in the diagram at the right. The center line lies on a boundary of the quarter round, and so should not be removed by any further planning or carving.

Next strike lines to divide the two 5-unit flats in half, as indicated by arrows. These lines and the outer two lines on the 45º tangent flat mark the edges of two new flats that are also tangent to the quarter round. Like with the 5–7 rule, these dimensions are a couple of percent off from the exact locations, but are more than accurate enough for this application. The remaining material to be pared away is shown shaded in the diagram and produces two more flats tangent to the quarter round.



Finally, strike center lines on these two new flats to mark additional boundaries of the quarter round, and fair the four ridges to complete the surface.

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