



Figure 1 COMPARISON OF EXACT METHOD OF ANGLE TRANSLATION WITH THE APPROXIMATE METHOD

In Figure 1 a reference angle of 43 degrees is used shifted by -5 degrees to give a new "main" angle of 38 degrees. In the traditional approximate method each of the other angles on the design ("star", "break", "wing" etc) would also be shifted the same amount. This is the straight line labelled "approximate". The curve labeled "exact" is the "Tangent Ratio" translation which is based on the relationship

$$\theta_{new} = \tan^{-1} \left[\frac{\tan 38}{\tan 43} \tan \theta_{old} \right]$$

The two curves are nearly coincident over the range of facet angles from 40 to 55 degrees, showing that the approximate method of translating angles has very little error in this region. That would include all the facets in a typical Standard Round Brilliant EXCEPT THE STAR FACETS. These would normally be at 27 degrees in the initial design, and would be translated to 22 degrees by the approximate method, whereas the exact method gives an angle of 23.1 to retain the same design proportions. The difference would be even greater if one chose either a lower "main" angle or a larger table size.