Special Spherical Ball

You are the proud owner of a very special crystal ball. Light from a distant object is focused by the front surface of the sphere onto the opposite side of the sphere. What is the index of refraction of the sphere? The sphere is in air.

Solution

\[ f'_R = 2R \]

\[ \phi = (n - 1)C = (n - 1)/R \]

\[ f'_R = 2R = \frac{n}{\phi} \]

\[ 2R = \frac{nR}{(n - 1)} \]

\[ 2 = \frac{n}{n - 1} \]

\[ n = 2 \]