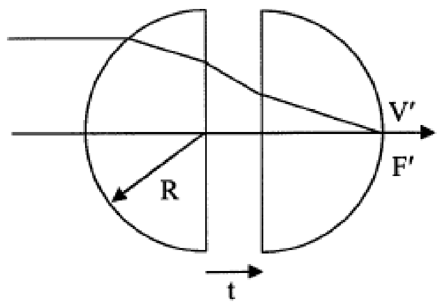
Separated Hemispheres



$\phi_1 = (1.5 - 1.0)/R$

$\phi_1 = 0.01/mm$

The curved surface of the second hemisphere has no optical effect for this problem.

Several solution methods possible.

Solution 1 Determine the BFD of the first hemisphere.

$\phi_2 = 0$ $\qquad \phi = \phi_1 = 0.01/mm \qquad f = f_R' = 1/\phi = 100\ mm$

For the first hemisphere, $n' = 1$

$$d' = -\frac{\phi_1}{\phi}\frac{t}{n} = -\frac{t}{n} = -\frac{R}{n} = -\frac{50}{1.5} = -33.33\ mm$$

$$BFD = f_R' + d' = 100mm - 33.33\ mm = 66.67\ mm$$

The second hemisphere looks just like a block of glass of thickness R placed after the first hemisphere. Use reduced thickness: For F′ at V′:

$$BFD = t + \frac{R}{n} = 66.67\ mm$$

$$t = 66.67 - 33.33 = 33.33mm$$

Solution 2 Consider this situation to be a single refracting surface with a inserted "block" of air.

$f_1 = 1/\phi_1 = 100$ mm Here $n' = 1.5$ for the refracting surface.

$f'_e = n f_1 = 150$ mm

For F' at V': $f'_R = R + nt + R = 150$ mm

$nt = 50$ mm $t = 33.33$ mm

or solve in reduced thicknesses:

$f = f'_R/n = R/n + t + R/n = 100$ mm

$t = 33.33$ mm