If one designs a concentrator that accepts as a maximum input angle the half angle of the sun as seen from the Earth, about 1/4°, then it could have a maximum concentration of about 200 in the two-dimensional case and 40 000 in the three-dimensional case. Such a concentrator would accept light only directly from the surface of the sun. Regions of the sky outside this area would be rejected by the concentrator; that is, it would not reach the receiver. Interestingly, the concentration of 40 000 restores the radiative power density at the receiver to that at the surface of the sun. This leads to a simple proof of the above equations. Suppose we have a hot spherical radiator, which could be the sun but need not be, that is radiating black-body radiation. A portion of the radiation is intercepted by a concentrator as shown in Figure 11.20.

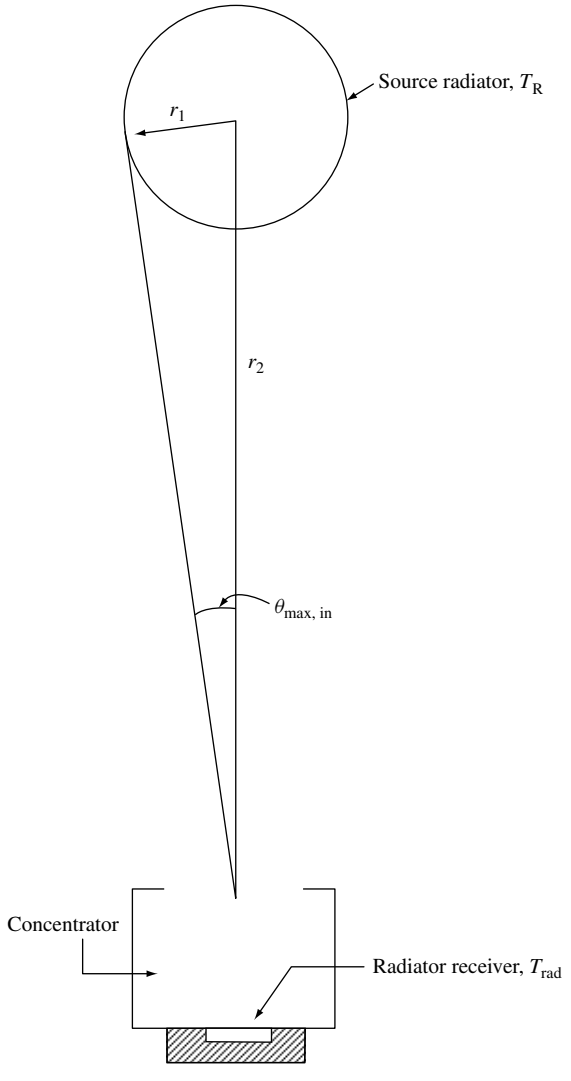

Figure 11.20 Geometry of a spherical radiator and concentrator