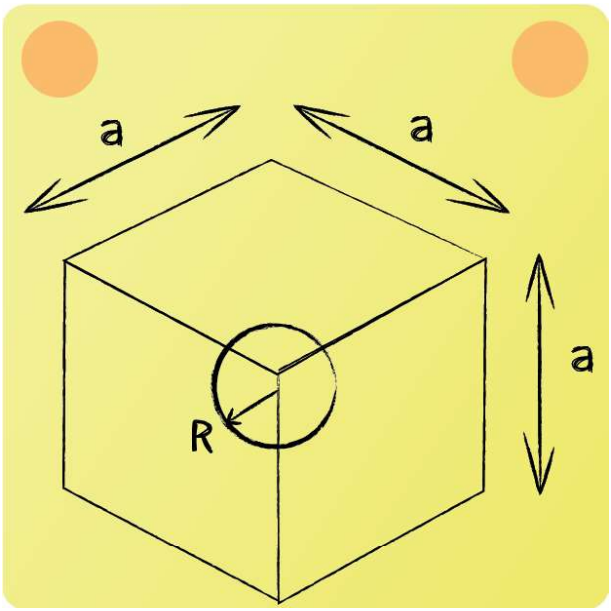
Exam Preparation - Radiation 2



Compute the rate of heat transfer from the cube to the sphere. Assume the cube and sphere to thermally black.

Summation rule:

$$\Phi_{ss} + \Phi_{sc} = 1 \qquad \Rightarrow \qquad \Phi_{sc} = 1$$

The result above results form the fact that $\Phi_{ss} = 0$
Reciprocity rule:

$$A_s \cdot \Phi_{sc} = A_c \cdot \Phi_{cs} \qquad \Rightarrow \qquad \Phi_{cs} = \frac{A_s}{A_c} = \frac{2\pi R^2}{3a^2}$$

And thus

$$\dot{Q}_{cs} = A_c \cdot \Phi_{cs} \cdot \sigma \cdot T_c^4 = 21 \text{ kW}$$

Note that the rate of heat transfer form the cube to the sphere is asked and **not the net rate!**