Instructor's guide

This activity follows Using the Stefan-Boltzmann law

A grey space capsule is sent on a trip to the Moon. The surface is designed to reflect 50% of the incident sunlight (i.e. it is "grey" for wavelengths less than about 3 or 4 μm). The total intensity of radiation emitted by the surface (wavelengths longer than about 3 or 4 μm) are still described by σT^4.

The capsule is spherical and has a radius of 3 meters.

The space capsule reaches thermal equilibrium after being bathed in sunlight for a few hours. The capsule is rotating and is made of thermally conducting metal, so that all sides have the same temperature. Find the temperature.

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Figure 1: **Hint:** The energy of the sunlight absorbed by a sphere can be calculated by finding the area of the shadow, which is also known as its cross-sectional area.