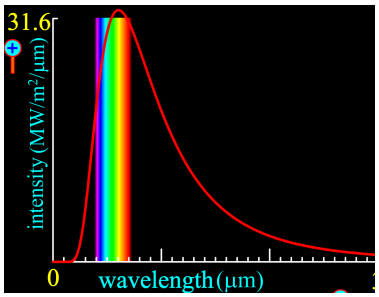
Blackbody spectrum worksheet



https://phet.colorado.edu/en/simulation/blackbody-spectrum

- Give your answers to 1 or 2 significant figures.
- Use a large whiteboard.

1. What is the peak spectral intensity, in units of MW/(m^2·μm), emitted by the

- the surface of the earth,
- the surface of a hot oven,
- the surface of a light bulb filament,
- the surface of the sun.

2. At what wavelength does the peak in spectral intensity occur? Give your answer in μm.

- λ_{peak} for the surface of the earth,
- λ_{peak} for the surface of a hot oven,
- λ_{peak} for the surface of a light bulb filament,
- λ_{peak} for the surface of the sun.

3. We expect λ_{peak} to correspond to the highest-frequency quantum harmonic oscillator that is "switched on" by thermal energy. Sketch a rough calculation to estimate the answers to question 2. How well do your rough calculation results agree with the computer simulation?

4. How cold should you make an object if you want zero thermal radiation emitted?

5. Consider the blackbody spectrum emitted by an incandescent light bulb. Estimate what fraction of the emitted energy is wasted (i.e. not visible light).

6. The graph below shows the spectrum from an LED light bulb. This is **not** a blackbody spectrum. Estimate what fraction of the emitted energy is wasted (i.e. not visible light).