

Temperature of the Earth (10 points).

For at least the last few million years, the Earth has been in roughly thermal equilibrium with the radiation from the Sun at the Earth's orbital distance.

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| 2.1 | Assuming our planet to be an ideal black body, calculate what the Earth's equilibrium temperature (in Celsius) would be. | 4.0pt |
| 2.2 | The Earth's albedo is approximately 30%. Calculate the Earth's surface temperature (in Celsius) considering its albedo. | 2.0pt |
| 2.3 | <p>The Earth's absorbed radiation is reemitted as black body radiation from its surface, but its atmosphere re-absorbs 58% of that energy, causing a greenhouse effect. Considering this effect, calculate the Earth's surface temperature (which will be the same as the temperature of the lower atmosphere). Give your answer in Celsius.</p> <p>For simplicity, consider the reabsorption effect as happening only once, and do not consider the atmosphere as a separate black body.</p> | 4.0pt |