

# MIND-MELTING FACTS ABOUT THE SUN

National Aeronautics and Space Administration



MIND-MELTING FACTS



## Temperature vs. Heat

In space, the temperature can be thousands of degrees without “feeling hot” to the touch. Why? *Temperature* measures how fast particles are moving, whereas *heat* measures the total amount of energy that they transfer. Since space is mostly empty, there are very few particles to transfer energy to your hand. Particles may be moving fast (high temperature), but if there are very few of them, they won’t transfer much energy (low heat).

## The Solar “Surface”

The Sun does not have a solid “surface”—as a giant ball of plasma, or ionized gas, the density gradually increases as you move towards the core. The layer you can see, called the **photosphere**, is just the layer that emits the most light in the visible part of the electromagnetic spectrum. In fact, there are three layers on top of it, but the visible light they emit is too faint to see. Except during a total solar eclipse, when the corona can be seen by the naked eye!

## The Puzzle of Coronal Heating

As you walk away from a fire, you expect the temperature to go down. The Sun is quite different: the **corona**, the outermost layer of the Sun, is hotter than the layers immediately below it! Exactly how the corona gets so hot is one of the major unsolved puzzles of heliophysics.

SOLAR WIND

## Solar Core

Temperature: More than 27 million °F  
Density: 150 g/cm<sup>3</sup>  
(more than 10 times the density of lead)

## Radiative Zone

Temperature: 3.5 million °F  
Density: From 20 g/cm<sup>3</sup>  
(the density of gold) to 0.2 g/cm<sup>3</sup>  
(less dense than water)

## Convection Zone

Temperature: 3.5 million to 10,000 °F  
Density:  $2 \times 10^{-7}$  g/cm<sup>3</sup>  
(.001% the density of air)

## Photosphere (VISIBLE LAYER)

Temperature: 10,000 °F  
Density:  $10^{-9}$  g/cm<sup>3</sup>  
(.00001% the density of air)

## Chromosphere

Temperature: 10,000 °F to 36,000 °F  
Density:  $10^{-12}$  g/cm<sup>3</sup>

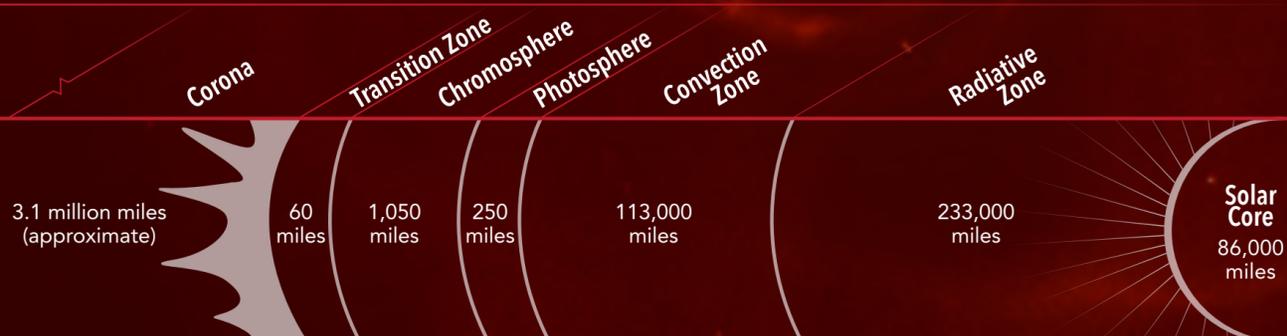
## Transition Zone

Temperature: 40,000 °F to 1.8 million °F  
Density:  $2 \times 10^{-13}$  g/cm<sup>3</sup>

## Corona (THE SUN'S ATMOSPHERE)

Temperature: 2 to 3 million °F  
Density:  $10^{-16}$  g/cm<sup>3</sup>

## THICKNESS OF EACH LAYER OF THE SUN



For more information, please visit:  
<https://science.nasa.gov/heliophysics>



Not to Scale