FLUIDS

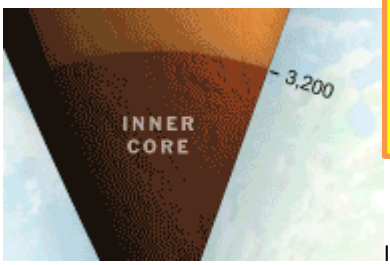
GEOLOGY APPLICATION **Unit 18 Dr John P. Cise , Professor of Physics, Austin Com. College,**

1212 Rio Grande St., Austin Tx. 78701 jpcise@austincc.edu & NYTimes 5/29/12 by Natalie Angier

The Enigma 1,800 Miles Below Us

As if the inside story of our planet weren't already the ultimate potboiler, a host of new findings has just turned the heat up past Stygian.

Multimedia



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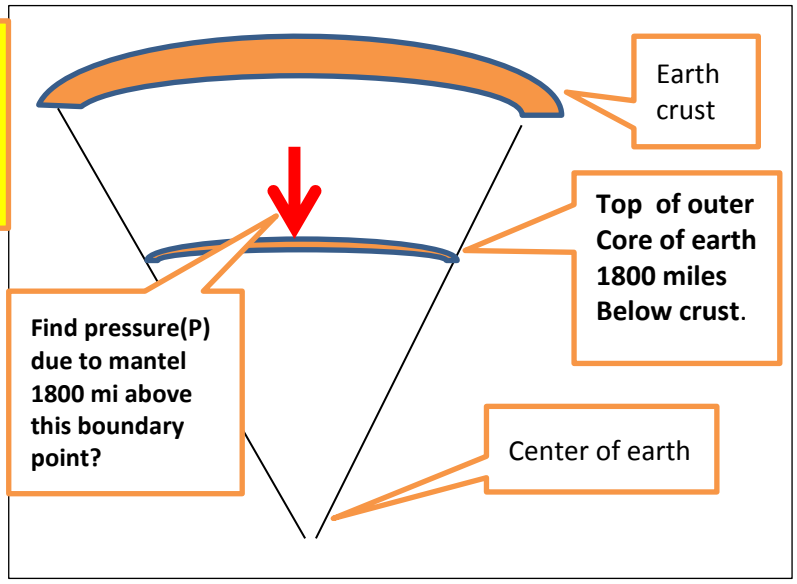
Interactive Feature

The Structure and Movement of the Deep Earth



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A diagram of the Earth's center as a giant ball of fire from the 1678 book "Subterranean World."

INTRODUCTION: **The density(g/cm^3) of inner earth is as follows: Crust 2.7-3 . Mantle…3 – 5.7 , Outer core(liquid) 10 – 12.2 , inner core(solid) 12.6 – 13. Thus, here we will take density at outer core surface to be 12 g/cm^3.**

QUESTION: **Show the pressure at 1800 miles depth at top of inner core is on the order of 3.5 million atmospheres as stated in this news article?**

HINTS: **P = ρ g h where ρ = mass density(grams/cm^3), g = 9.8 m/s^2, h = depth, 1.62 km/mile , 1000 grams/kg , 10^{-6} m^3/cm^3 , 1 atmosphere = 100,000 N/m^2, Solve for P in units of N/m^2, then convert to atmospheres.**

Geologists have long known that Earth's core**, some 1,800 miles beneath our feet,** is a dense, chemically doped ball of iron roughly the size of Mars and every bit as alien. It's a place where **pressures bear down with the weight of 3.5 million atmosphere**s, like 3.5 million skies falling at once on your head, and where temperatures reach 10,000 degrees Fahrenheit — as hot as the surface of the Sun. It's a place where the term "ironclad agreement" has no meaning, since iron can't even agree with itself on what form to take. It's a fluid, it's a solid, it's twisting and spiraling like liquid confetti. Researchers have also known that Earth's inner Martian makes its outer portions look and feel like home. The core's heat helps animate the giant jigsaw puzzle of tectonic plates floating far above it, to build up mountains and gouge out seabeds. At the same time, the jostling of core iron generates Earth' magnetic field, which blocks dangerous cosmic radiation, guides terrestrial wanderers and brightens northern skies with scarves of auroral lights.