

Earth Layer Detectives

Read evidence to compare Earth's four main layers.

S6E5.a "Ask questions to compare and contrast the Earth's crust, mantle, inner and outer core, including temperature, density, thickness, and composition."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline statements that compare two Earth layers, then circle the words or numbers that show differences in temperature, density, thickness, or composition.

Below Earth's Surface

- ① Earth's solid outer region is arranged in layers that differ like materials in a heated workshop. The crust is the thin, cool outer skin where continents and ocean floors sit. Beneath it lies the mantle, a much thicker layer of hot rock that can flow very slowly over long periods. Scientists use rock samples, earthquake waves, and measurements to investigate layers far below the surface.

APPROXIMATE PROPERTIES OF EARTH'S LAYERS

Layer	Thickness	Density	Main composition
Crust	5–70 km	2.7–3.0 g/cm ³	Silicate rocks
Mantle	2,900 km	3.3–5.7 g/cm ³	Silicate rock with magnesium and iron
Outer core	2,260 km	9.9–12.2 g/cm ³	Liquid iron and nickel
Inner core	1,220 km	12.8–13.1 g/cm ³	Solid iron and nickel

- ② At about 2,900 kilometers thick, the mantle makes up most of Earth's thickness. It is made mostly of silicate rock rich in magnesium and iron. Although mantle rock is solid, high heat and pressure let some parts move slowly. The crust is less dense than the mantle and is made mostly of silicate rocks containing oxygen, silicon, and other elements.
- ③ Far deeper, the core has two parts made mainly of iron and nickel. The outer core is liquid because its temperature is high enough to melt its metal. The inner core is even hotter, but enormous pressure keeps it solid. Both core parts are denser than the mantle. The inner core has a smaller thickness than the outer core.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 How do the crust and mantle compare in thickness and density?

2 What composition do the crust and mantle share, and what different elements are named for each layer?

3 How can the inner core be hotter than the outer core but still be solid?

4 Compare the density ranges of the outer core and inner core. Which layer is denser?

3 YOUR TURN _____ Your own words

Choose any two Earth layers. Write one comparison question about their temperature, density, thickness, and composition, then answer your question using evidence from the passage and table.

PART 1 • READ AND MARK

Underline statements that compare two Earth layers, then circle the words or numbers that show differences in temperature, density, thickness, or composition. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How do the crust and mantle compare in thickness and density?	The crust is 5-70 km thick and less dense, at 2.7-3.0 g/cm³. The mantle is about 2,900 km thick and has a density of 3.3-5.7 g/cm³.
2	What composition do the crust and mantle share, and what different elements are named for each layer?	Both contain silicate rock. The crust is described with oxygen and silicon, while the mantle is rich in magnesium and iron.
3	How can the inner core be hotter than the outer core but still be solid?	The inner core is under enormous pressure, which keeps its iron and nickel solid even at a higher temperature.
4	Compare the density ranges of the outer core and inner core. Which layer is denser?	The outer core is 9.9-12.2 g/cm³, and the inner core is 12.8-13.1 g/cm³. The inner core is denser.

PART 3 • YOUR TURN (SAMPLE ANSWER)

How do the crust and outer core compare in temperature, density, thickness, and composition? The crust is cooler, 5-70 km thick, and 2.7-3.0 g/cm³, and it is made of silicate rocks. The outer core is hotter and liquid, 2,260 km thick, and 9.9-12.2 g/cm³, and it is made mainly of iron and nickel.

Accept accurate comparisons that use evidence from the passage or table. For the open response, accept any two layers if the student asks a comparison question and addresses all four named properties.