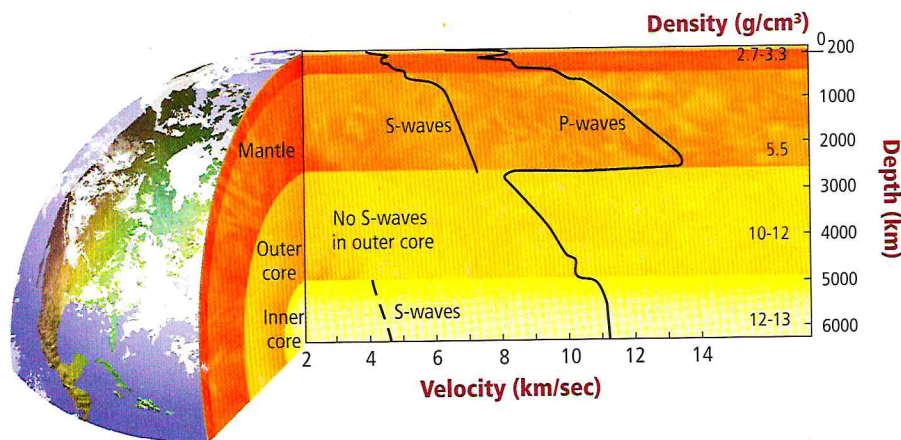


■ **Figure 19.10** Earth's layers are each composed of different materials. By examining the behavior of seismic waves moving through different kinds of rock, scientists have determined the composition of layers all the way to Earth's inner core.

Concepts in Motion

Interactive Figure To see an animation of P-waves and S-waves, visit glencoe.com.



Visu

Figure 1
structure. Th

Clues to Earth's Interior

The seismic waves that shake the ground during an earthquake also travel through Earth's interior. This provides information that has enabled scientists to construct models of Earth's internal structure. Therefore, even though seismic waves can wreak havoc on the surface, they are invaluable for their contribution to scientists' understanding of Earth's interior.

Earthquake
focus —

Earth's internal structure Seismic waves change speed and direction at the boundaries between different materials. Note in **Figure 19.10** that as P-waves and S-waves initially travel through the mantle, they follow fairly direct paths. When P-waves strike the core, they are refracted, which means they bend. Seismic waves also reflect off of major boundaries inside Earth. By recording the travel-time curves and path of each wave, seismologists learn about differences in density and composition within Earth.

What happens to the S-waves generated by an earthquake? To answer this question, seismologists first determined that the right-angle motion of S-waves will not travel through liquid. Then, seismologists noticed that S-waves do not travel through Earth's center. This observation led to the discovery that Earth's core must be at least partly liquid. The data collected for the paths and travel times of the waves inside Earth led to the current understanding that Earth's core has an outer region that is liquid and an inner region that is solid.

Earth's composition **Figure 19.11** shows that seismic waves change their paths as they encounter boundaries between zones of different materials. They also change their speed. By comparing the speed of seismic waves with measurements made on different rock types, scientists have determined the thickness and composition of Earth's different regions. As a result, scientists have determined that the upper mantle is peridotite, which is made mostly of the mineral olivine. The outer core is mostly liquid iron and nickel. The inner core is mostly solid iron and nickel.

VOCABULARY

ACADEMIC VOCABULARY

Encounter

to come upon or experience, especially unexpectedly

We had never encountered such a violent storm.

conce
waves,