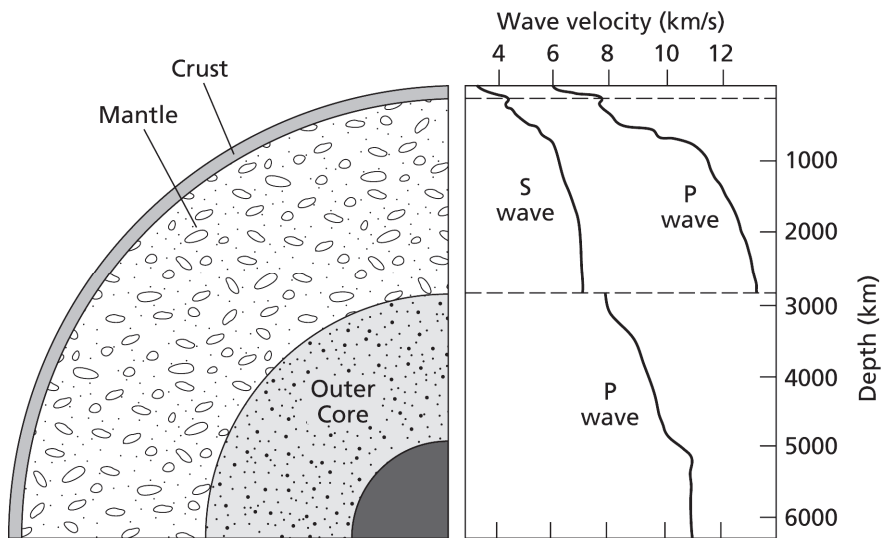


# CHAPTER 14 ENRICHMENT

## EARTHQUAKE WAVE VELOCITIES

Earthquakes produce both longitudinal waves, known as P waves, and transverse waves, known as S waves. Geologists have used properties of these waves to predict the composition of Earth’s interior. They think that Earth consists of three main zones: the crust, the mantle, and the core. They think the core consists of a liquid outer core and a solid inner core.

P waves and S waves travel through various rock materials at different velocities. S waves cannot pass through molten (liquid) rock. If Earth’s composition were that of a uniform solid, the velocities of P and S waves would increase steadily with depth, because increasing pressure beneath the surface increases the elastic properties of the rock, which in turn increases wave velocities. However, the interior rock composition is not uniform; it changes with depth, so earthquake wave velocity does not increase smoothly, as shown in the graph below.



1. How fast do P waves move in the crust?  
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2. How fast do S waves move in the crust?  
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3. What happens to S waves approximately 2900 km below Earth’s surface? Why?  
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4. Using only data on P waves, how could you determine the depth of the boundary between the mantle and the outer core?

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5. How does P-wave speed indicate that the inner core is composed of solid rock?

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6. S waves can travel through solid rock, and the inner core is solid. Why then are no S waves found in the inner core?

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7. Which is likely to be a more distinct transition—from the mantle to the outer core or from the outer core to the inner core? Why?

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