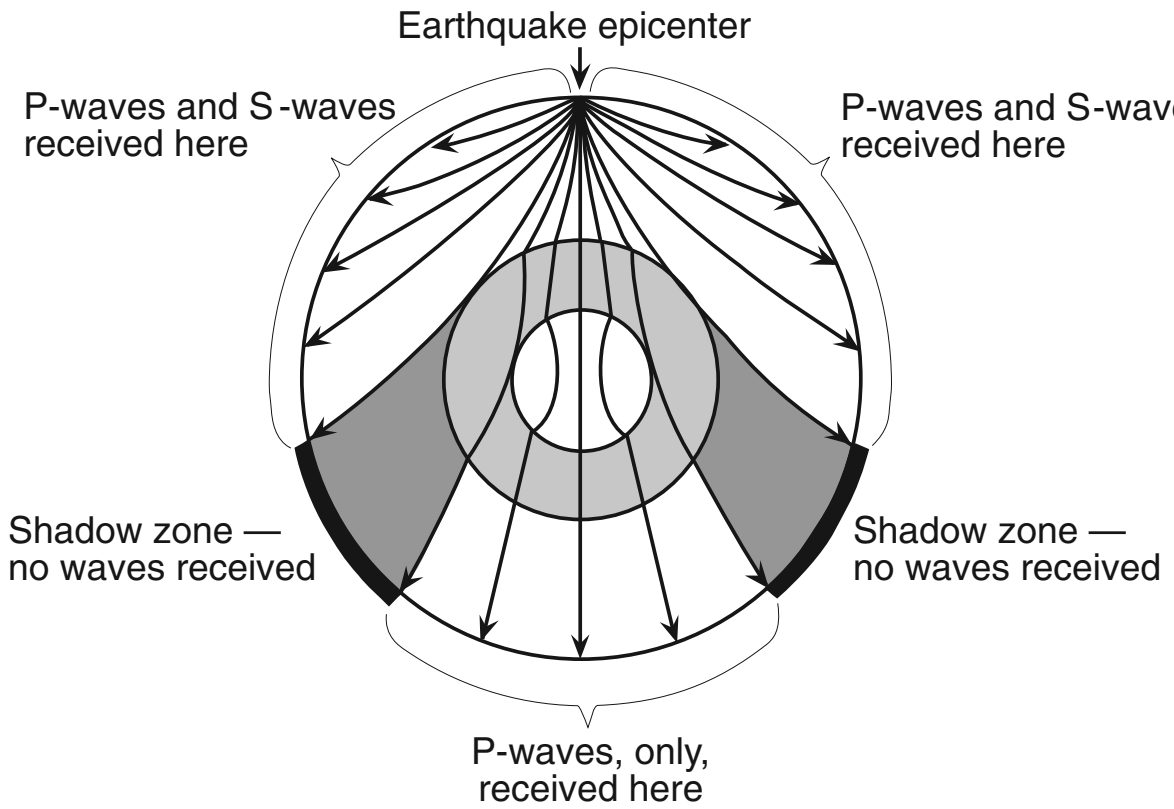
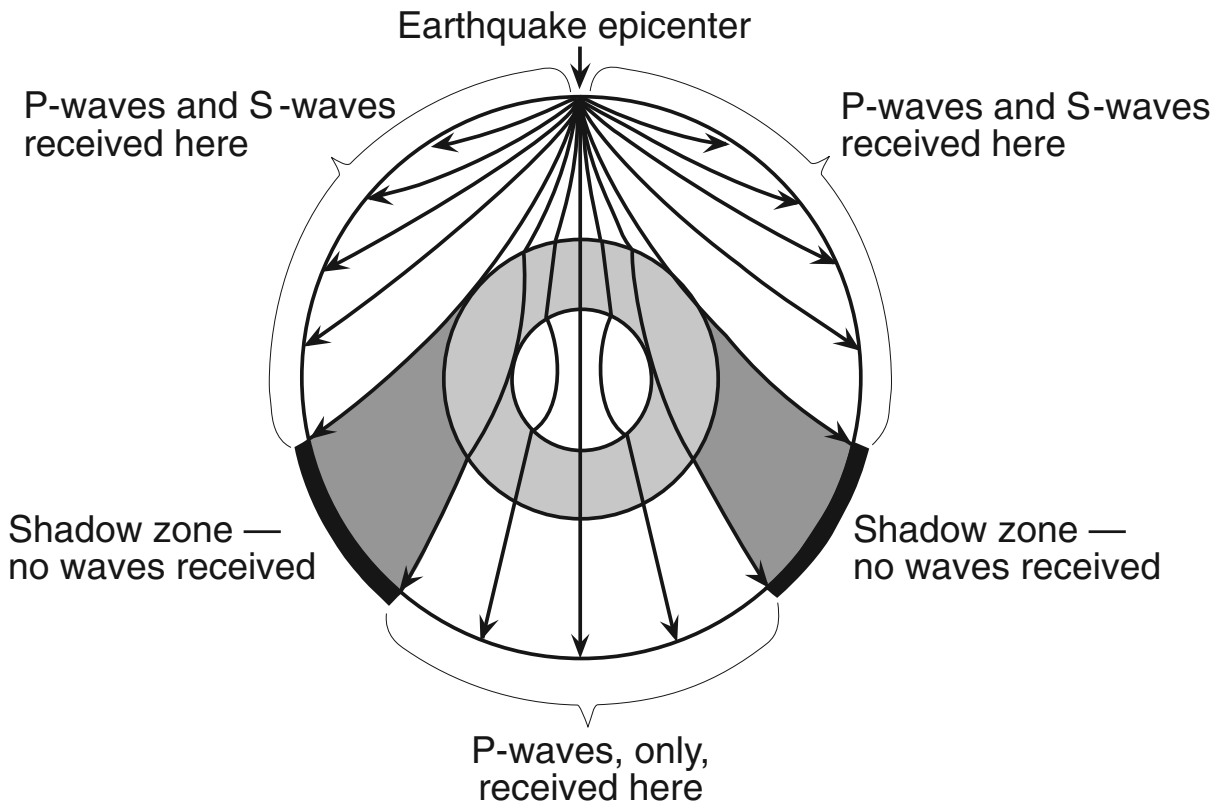
The Shadow Zone



P-Waves are able travel through solids, liquids, and gases while S-Waves can only travel through solids. Therefore, S-Waves cannot travel through the liquid out core. As a result, only P-Waves will be received on the side of the Earth opposite the earthquake epicenter. This zone is called the ***S-Wave Shadow Zone***.

As P-Waves and S-Waves travel through the interior of the Earth, they pass through materials of different density. As they pass through more dense materials, their speed increases causing them to change direction. You will notice above that all seismic waves travel along curved paths. One result is that there is a zone on the Earth that will not receive any P-Waves due to the bending of the waves as they travel through the different layers of the Earth. This is known as the ***P-Wave Shadow Zone***.

There is a region of the Earth (seen in the shaded area on the diagram) that will receive no seismic waves from this earthquake due to the S-Waves being absorbed by the liquid outer core and the P-Waves being curved, or refracted, by the changing densities of the Earth's interior. The zone that receives no seismic waves is known simply as the ***Shadow Zone***.



1. Explain why no S-Waves are received on the side of the Earth opposite the epicenter.

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2. Explain why no P-Waves are received on the area labeled “Shadow Zone.”

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3. Explain what causes seismic waves to travel along curved paths instead of straight lines.

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4. What is the relationship between rock density and the velocity of the seismic waves?

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5. Is the shadow zone always in the same location on Earth? Explain.

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