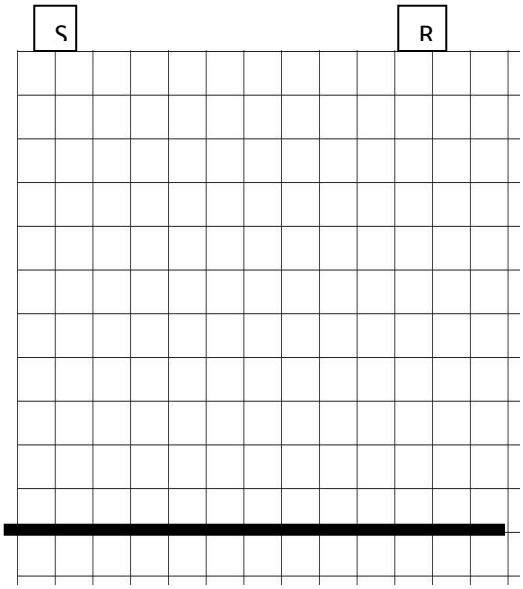
Normal Move Out: Geophysics Lab

Draw a reflection raypath on the following diagram and label the vertices and angles of the two right triangles formed by the raypath. Derive the non-approximated reflection time equation using Pythagora's theorem (Eqn. 7.1). Assume an upper layer velocity and thickness of v_1 and h_1.



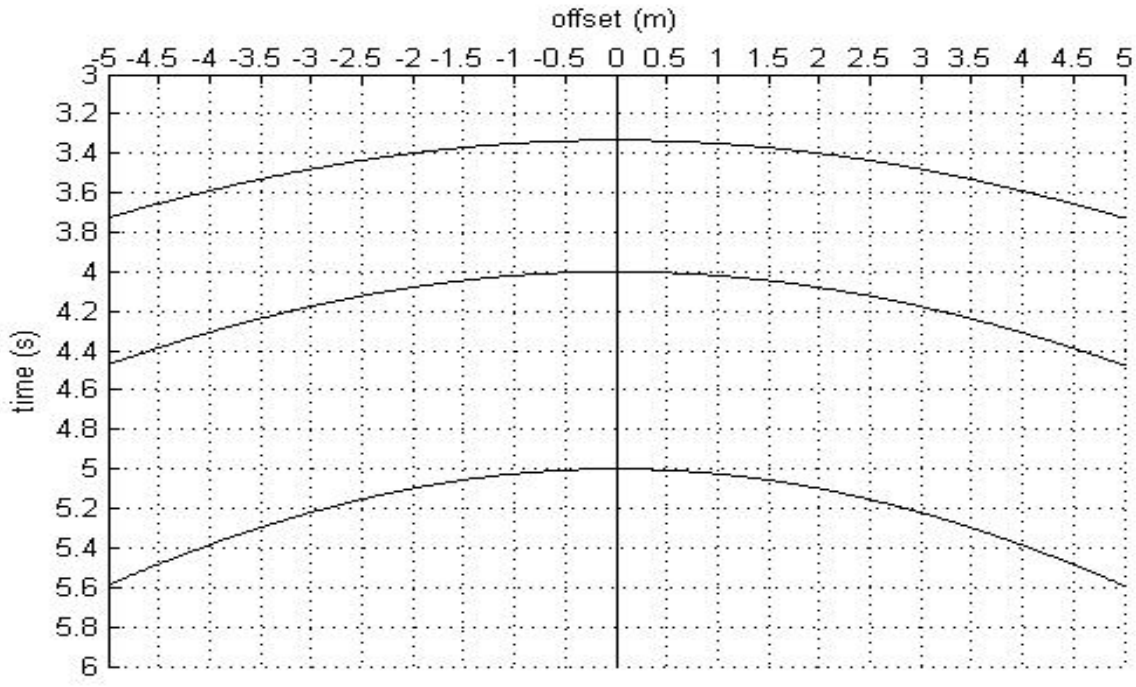
1. Multiple out your NMO equation to get two terms (Eqn. 7.1) and identify the two-way travel-time (t_0) and NMO terms. Define in words the difference between these two terms (Eqn. 7.2).

2. Use the approximated NMO equation (Eqn. 7.3), solve for the velocity of layer one (v_1) function (Eqn. 7.4). What variables are measured from the seismic record to calculate the velocity.

3. Derive the equation used to calculate the two-way reflection travel-time (t_0).

4. The book (pg. 84) defines reasons why a seismic section is NOT a true image of the subsurface. What are they?

5. The following graph shows three reflection hyperbolas for three different layer velocities. Using the velocity equation (Eqn. 7.4), calculate the layer velocities for the three reflection hyperbolas.



Top hyperbola velocity _____ Middle Hyp. velocity _____ Bottom Hyp. velocity _____

6. If multiple layers are analyzed, write down the equation that defines the velocity definition to be used in equation 7.2 and define the terms in words.

7. Write down Dix's formula (Eqn. 7.7) and define the variables . Define what the layer velocity (V_{layer}) and the root-mean-square (RMS) velocity (V_{rms}) are used to calculate.