Name:_____, **Team:**_____

1. Which of the following types of waves propagates the fastest?
   (a) Rayleigh waves
   (b) Love waves
   (c) P-waves
   (d) S-waves

2. A seismic wave reaches an interface that has a reflection coefficient of -0.25. Which of the following is **true**?
   (a) The reflected wave has 25% of the incoming wave's amplitude
   (b) The transmission coefficient is greater than 1
   (c) The reflected wave experiences a reverse in polarity
   (d) All of the above

3. You would like to image a sedimentary layer using reflection seismology. The layer is characterized by a p-wave velocity of 2200 m/s. What pulse width must be used to have a vertical resolution of 40 cm?
   (a) 0.181 ms
   (b) 1.81 ms
   (c) 0.727 ms
   (d) 7.27 ms

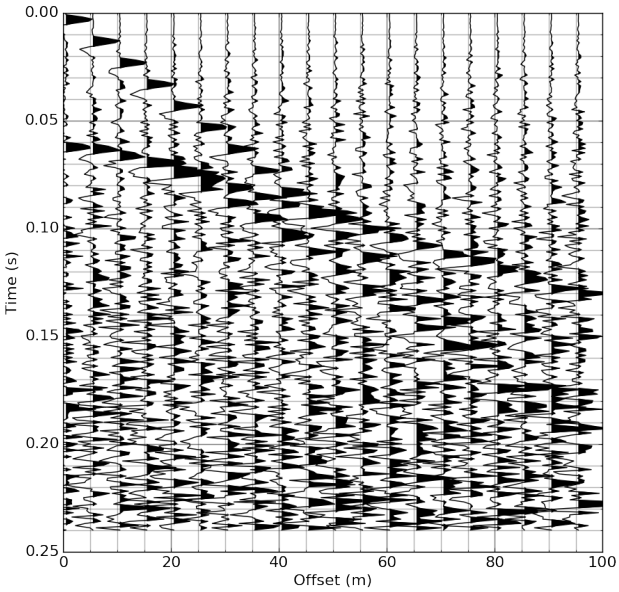

Figure 1: Seismic Refraction Section

4. Figure 1 shows the seismogram for a refraction survey over a 2 layered Earth. From the refracted arrival, estimate the velocity of the lower layer. Note the units.
   (a) 1300 m/s
   (b) 650 m/s
   (c) 500 m/s
   (d) cannot be calculated

5. By looking at Figure 1, what is the approximate observed *critical distance* for the refracted arrival?
   (a) 20 m
   (b) 5 m
   (c) 40 m
   (d) not clear for this survey

6. What is the **most important** reason why a seismic refraction survey would **not** be effective?
   (a) The layer velocities do not strictly increase with respect to depth
   (b) The layer impedances do not strictly increase with respect to depth
   (c) The layers are dipping
   (d) The Earth's surface is not flat

7. In a travel-time versus distance plot in seismic refraction, the slopes of the segments depend on the
   (a) change in seismic velocity at the boundary.
   (b) seismic velocity in each layer.
   (c) thickness of each layer.
   (d) seismic velocity and dip in each layer.

8. Prior to "stacking" the data from a Common Midpoint Gather survey, the data must be
   (a) filtered to remove noise.
   (b) converted to common shot gathers.
   (c) corrected for the normal moveout of the reflections.
   (d) all of the above.

9. A common midpoint gather refers to:
   (a) seismic traces acquired from a single shot.
   (b) seismic traces that are acquired with a constant source receiver separation.
   (c) seismic traces that have been moveout corrected with respect to a central geometrical location.
   (d) seismic traces that have a source and receiver symmetrically placed about a single location.

10. For a given reflection event, the optimum NMO correction is one that:
    (a) results in minimum energy for all stacked NMO corrected traces
    (b) results in maximum energy for all stacked NMO corrected traces
    (c) requires the smallest stacking velocity v_{st}
    (d) requires the smallest intercept time t_0

1 Formula Sheet

Seismic

Velocities	$v_p = \sqrt{\frac{K + 4/3\mu}{\rho}}$	$v_s = \sqrt{\frac{\mu}{\rho}}$
Acoustic impedance	$Z = \rho v$	$R = \frac{Z_2 - Z_1}{Z_2 + Z_1}$ $T = \frac{2Z_2}{Z_2 + Z_1}$
General	$d = vt$	$\lambda = vT = \frac{v}{f}$
Vertical resolution	$L = \frac{\lambda}{4}$	
Refraction arrivals	$t = \frac{x}{v_2} + 2z\frac{\sqrt{v_2^2 - v_1^2}}{v_1 v_2} = \frac{x}{v_2} + t_i$	
Cross-over distance	$x_{cross} = \left(\frac{v_1 v_2}{v_2 - v_1}\right) t_i = 2z\sqrt{\frac{v_2 + v_1}{v_2 - v_1}}$	
Refraction Angles	$\frac{\sin\theta_1}{v_1} = \frac{\sin\theta_2}{v_2}$	
Reflection hyperbola	$t(x)^2 = t_0^2 + \frac{x^2}{v^2}$	x=distance from Tx to Rx