ASTHENOSPHERE

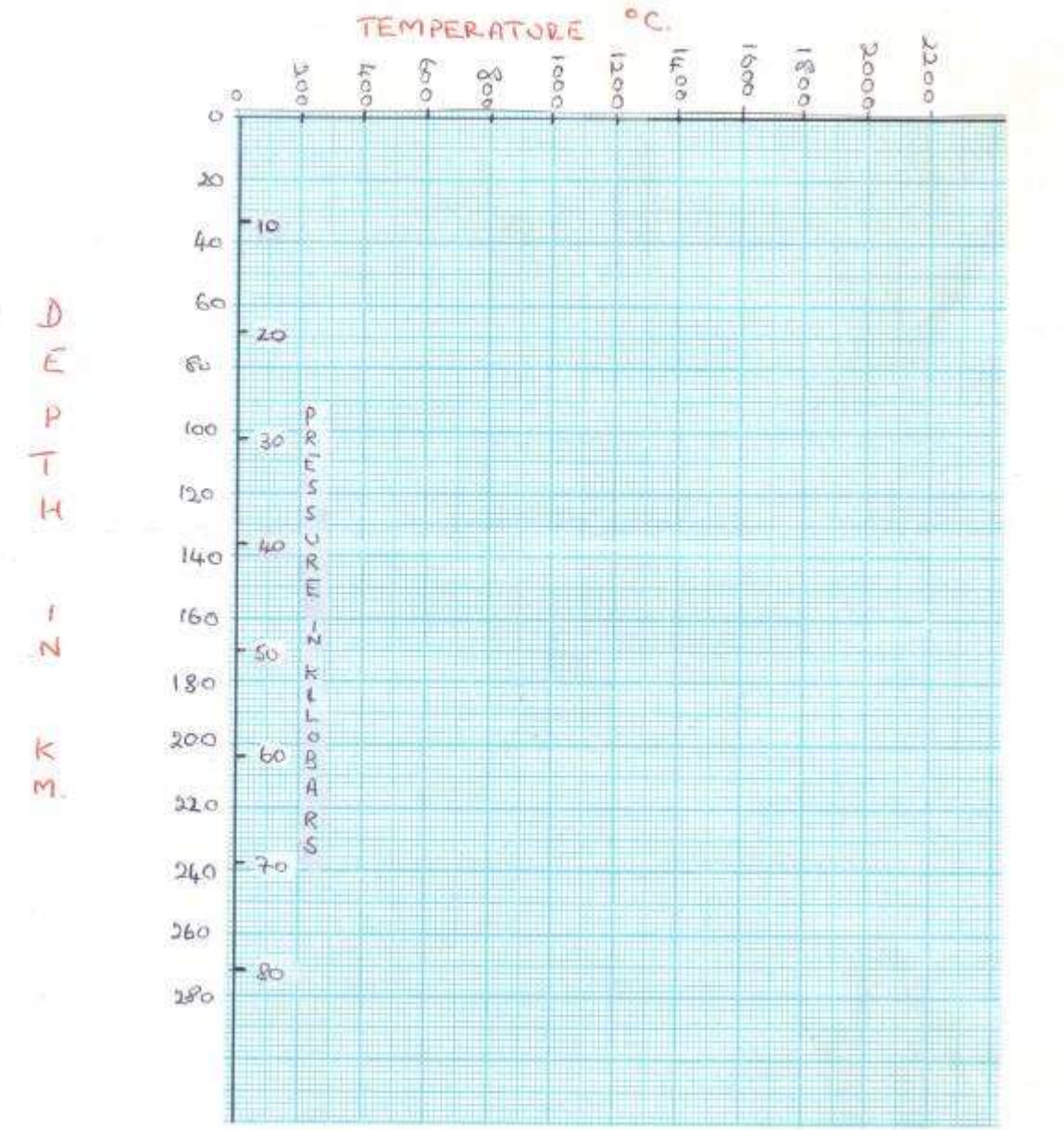
The asthenosphere, also known as the low velocity zone, is part of the upper mantle where the velocity of seismic waves is lower than both below and above. Plot the data below on the graph paper provided to find out why there is a slowing of the seismic waves and the depth below the surface of the top and bottom of the asthenosphere.

First plot the temperature of the earth at various depths. Join the dots up with a smooth curve. This is called the geothermal gradient.

depth km	*pressure at that depth in kilobars*	*temperature °C*
0	*0*	*0*
34	*10*	*550*
68	*20*	*1050*
102	*30*	*1325*
136	*40*	*1450*
170	*50*	*1550*
204	*60*	*1625*
238	*70*	*1700*
272	*80*	*1730*

Now plot on the same graph paper the melting temperature of peridotite. For any one pressure two melting temperatures are given, one for dry peridotite and one for peridotite melted in the presence of water.

pressure in kilobars	*dry melting temperature °C*	*wet melting temperature °C*
0	*1200*	*1200*
10	*1300*	*1150*
20	*1400*	*1110*
30	*1500*	*1110*
40	*1600*	*1160*
50	*1700*	*1220*
60	*1800*	*1360*
70	*1900*	*1530*
80	*2000*	*1760*



Under what conditions and between what depths might the mantle melt?