

## Problems on Chapter 2: Vertical Distributions

**Q 2.1:** What is the pressure difference between the top and bottom of a building 25 m high when the pressure at the bottom is 1000 hPa and the temperature is 20°C?

**Q 2.2:** What is the temperature of an isothermal atmosphere in which the pressure is 1000 hPa at the surface and 500 hPa at a height of 5 km?

**Q 2.3:** Complete the table:

<i>Pressure</i>	<i>Temperature</i>	<i>Potential Temperature</i>
500 hPa	-20°C	
10 hPa		850 K
800 hPa	30°C	
200 hPa		350 K
	230 K	460 K

**Q 2.4:** An air parcel at 400 hPa has a temperature of -30°C. What temperature would it have if it was brought adiabatically to (a) 1000 hPa, (b) 200 hPa?

**Q 2.5:** Find an expression in terms of the pressure for the rate of change with height of potential temperature in an isothermal atmosphere. Evaluate your expression at a pressure of 1000 hPa.

**Q 2.6:** What is the Brunt-Vaisala frequency in an isothermal atmosphere?

**Q 2.7:** How might the Brunt-Väisälä frequency be imaginary, and what does the equation for  $\delta z$  then tell us?