**U1\_L2\_ALL5** Application of Science – Keys

Adapted from Wikipedia pages.

Group A: Why can boiling water temperature be used to esteem elevation?

Pure water boils at 100 °C (212 °F) at earth's standard atmospheric pressure. The boiling point is the temperature at which the vapor pressure is equal to the atmospheric pressure around the water. Because of this, the boiling point of water is lower at lower pressure and higher at higher pressure. Cooking at high elevations, therefore, requires adjustments to recipes. A rough approximation of elevation can be obtained by measuring the temperature at which water boils; in the mid-19th century, this method was used by explorers.

Group B: Do you think that it is possible to accurately measure elevation using barometers?

An important application of the knowledge that atmospheric pressure varies directly with altitude was in determining the height of hills and mountains thanks to the availability of reliable pressure measurement devices. In the 18th Century, William Roy using barometric pressure was able to determinate the height of Schiehallion in Scotland , the agreement being to within one meter. This was then a useful tool for survey work and map making and long has continued to be useful. It was part of the "application of science" which gave practical people the insight that applied science could easily and relatively cheaply be "useful”.

Group C: Can a difference in pressure between inside and outside be dangerous to the human body?

This is Barotrauma: a physical damage to body tissues caused by a difference in pressure between a gas space inside the body, and the surrounding gas or fluid. The initial damage is usually due to over-stretching the tissues in tension or shear, either directly by expansion of the gas in the closed space, or by pressure difference hydrostatically transmitted through the tissue. Barotrauma typically occurs when the organism is exposed to a significant change in ambient pressure, such as when a scuba diver, a free-diver or an airplane passenger ascends or descends.

Group D: How much is the pressure over a diver 10.3m underwater?

Consider the weight of 10 m3 of water over a 1 m2 surface. You'll find out that the pressure caused by the weight of a column of fresh water of approximately 10 m is about 100 kPa (one atmosphere).
Thus, a diver 10 m underwater experiences a pressure of about 2 atmospheres (1 atm of air plus 1 atm of water).