

HOMEWORK 1 - due Monday, October 8

1) Complete the following table.

parameter	symbol	units	typical value and quantity
temperature	T	°C or °K	100 °C is the boiling point of water at 1 atm. of pressure
thermal conductivity			
density			
coefficient of thermal expansion (volumetric)			
acceleration of gravity			
gravitational constant			
Young's modulus			
Poisson's ratio			
viscosity, dynamic			

2) Devise a thought experiment to measure each quantity. This has to be physically realistic but not necessarily practical.

Example temperature - One could use a thermometer to measure temperature but that depends on knowing the coefficient of thermal expansion. One could use the definitions of the freezing/boiling point of water to define temperatures of 0°C and 100°C. One could use the Stefan-Boltzmann law to measure temperature by measuring radiation L from a black body at temperature T .

$$L = \sigma T^4$$

where σ is the Stefan Boltzmann constant ($5.67 \times 10^{-8} \text{ W m}^{-2} \text{ °K}^{-4}$).