NAME _____

STUDENT No. _____

SECTION No. _____

STUDENT NUMBER

SECTION NUMBER

TEST CODE No.

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   26 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   51 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   76 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   101 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   27 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   52 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   77 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   102 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   28 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   53 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   78 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   103 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Q1. When the temperature of a metal cylinder is raised from 0.0 °C to 100 °C, its length increases by 0.307%. Find the percent change in density.

A) -1.23
B) -0.610
C) -0.306
D) -0.913
E) -0.460

$$\Delta\rho = \frac{m}{V+\Delta V} - \frac{m}{V} = \frac{m/V}{1+\Delta V/V} - \frac{m}{V}$$

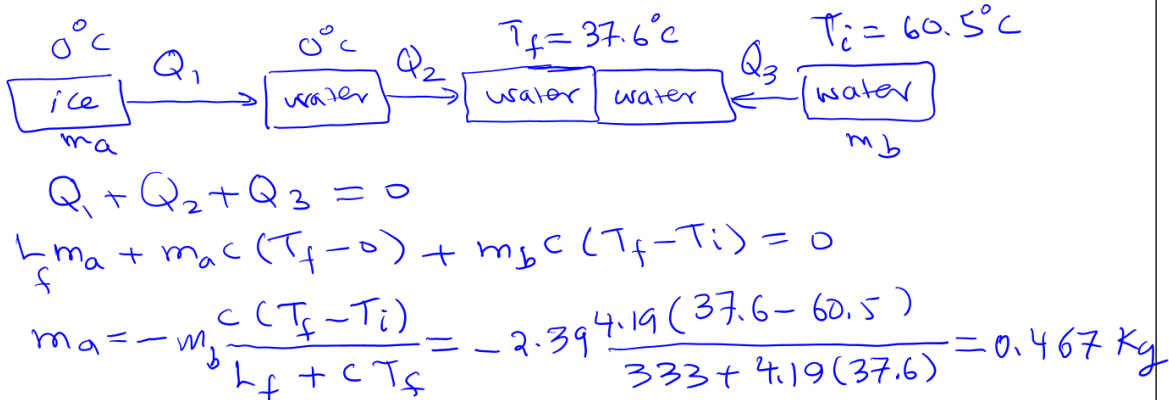$$\frac{\Delta\rho}{\rho} = \frac{1}{1+\Delta V/V} - 1 = -\frac{\Delta V/V}{1+\Delta V/V}$$

$$\frac{\Delta V}{V} = 3\alpha\Delta T = 3\frac{\Delta L}{L}$$

$$\frac{\Delta\rho}{\rho} = \frac{-3\Delta l/l}{1+3\Delta l/l} = \frac{-3(0.00307)}{1+3(0.00307)} = -0.00913 = -0.913\%$$

Q2. 2.39 kg of water is initially at a temperature of 60.5 °C. How many kilograms of ice, initially at 0 °C, must be added to the water to make a mixture with an equilibrium temperature of 37.6 °C? The specific heat of water is 4.19 kJ/kg·K, the heat of fusion is 333 kJ/kg, and the heat of vaporization is 2256 kJ/Kg.

A) 0.561
B) 0.689
C) 1.46
D) 0.407
E) 0.467

$$Q_1 + Q_2 + Q_3 = 0$$

$$L_f m_a + m_a c(T_f - 0) + m_b c(T_f - T_i) = 0$$

$$m_a = -m_b \frac{c(T_f - T_i)}{L_f + cT_f} = -2.39\frac{4.19(37.6 - 60.5)}{333 + 4.19(37.6)} = 0.467\ Kg$$

23 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   48 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   73 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   98 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   123 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

24 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   49 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   74 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   99 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   124 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

25 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   50 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   75 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   100 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   125 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ