KFUPM Physics Department	Phys102-251 Sec:01-02-03	Quiz-03-0921 21-Sep-2025

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. A steel tank is completely filled to the top with 5.80 m^3 of ethanol when both the tank and the ethanol are at a temperature of 45.7 °C. Now, the tank and its contents have been cooled to 16.3 °C. Calculate the additional volume of ethanol, in the unit liter, that can be added to fill the tank to the top. [For the steel $\beta = 3.60 \times 10^{-5}\ C^{0-1}$, for the ethanol $\beta = 7.50 \times 10^{-4}\ C^{0-1}$]

A) 91.3
B) 153
C) 108
D) 122
E) 67.0

$\Delta V_s = \beta_s V \Delta T \Rightarrow V_{sf} = V(1+\beta_s \Delta T)$

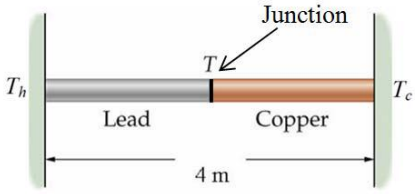
$V_{mf} = V(1+\beta_M \Delta T)$

$\Rightarrow$ you can add $V_{sf} - V_{mf} = V\Delta T(\beta_s - \beta_M)$

$= 5.8(16.3-45.7)(3.6\times10^{-5} - 7.5\times10^{-4}) = 0.122\ m^3 = 122\ L$

Q2. Two rods, made of lead and copper, of equal lengths and diameters are attached to each other as shown in the figure. The rods are placed between hot and cold reservoirs with temperatures T_h = 364 °C and T_c = 13.6 °C. Find the temperature T at the junction between the two rods.
(Given k_{lead}=35.0 W/m.K, and k_{copper}= 401 W/m.K)

A) 47.6
B) 41.7
C) 54.7
D) 63.0
E) 26.7



$P_{cond,\,copper} = P_{cond,\,Lead}$

$k_{copper} A \frac{T - T_L}{L} = k_{Lead} A \frac{T_H - T}{L}$

$T = \frac{k_{copper} T_L + k_{Lead} T_H}{k_{Lead} + k_{copper}} = 41.7\ ^\circ C$

23 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	48 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	73 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	98 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	123 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
24 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	49 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	74 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	99 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	124 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
25 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	50 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	75 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	100 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	125 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ