

# Physics I

## Thermal expansion

**Problem 1.-** You buy 15 gallons of gasoline when the temperature is  $T=15^{\circ}\text{C}$  paying 2.50 dollars per gallon.

- What is the difference in volume when the temperature reaches  $T=35^{\circ}\text{C}$ ?
- How much is this difference in dollars?

[ $\beta$  of gasoline is  $950 \times 10^{-6}/^{\circ}\text{C}$ ]

**Problem 1a.-** You top-off the 25-gallon steel gas tank of your truck when the temperature is  $10^{\circ}\text{C}$  and then leave the vehicle in the sun. How much gas spills if the temperature reaches  $35^{\circ}\text{C}$ ? [ $\alpha$  of steel is  $12 \times 10^{-6}/^{\circ}\text{C}$  and  $\beta$  of gasoline is  $950 \times 10^{-6}/^{\circ}\text{C}$ ]

**Problem 2.-** Mercury is used in thermometers because it expands more than glass when heated, changing the length of the column according to the temperature.

- Why is water not a good alternative to mercury?
- Why do we need to use other kind of thermometers below  $-39^{\circ}\text{C}$ ?

**Problem 3.-** What happens to the volume of 1 gram of water when it is cooled down from  $4^{\circ}\text{C}$  to  $1^{\circ}\text{C}$ ?