PHYS 202 Thermal Expansion Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The linear coefficients of thermal expansion are:
α steel = 12x10-6(Co)-1, α concrete = 12x10-6(Co)-1, α aluminum = 23x10-6(Co)-1.
Volumetric coefficient of thermal expansion of gasoline, βgasoline = 950 x10-6(Co)-1.

1. For the highest accuracy, would you choose aluminum or steel tape rule for year-round outdoor use? Why?

2. Concrete sidewalks are always laid in sections, with gaps between each section. For example, the drawing shows three identical 2.4-m sections, the outer two of which are against immovable walls. The two identical gaps between the sections are provided so that thermal expansion will not create the thermal stress that could lead to cracks. What is the minimum gap width necessary to account for an increase in temperature of 32 C°?



3. Suppose that the steel gas tank in your car is completely filled when the temperature is 17 °C. How many gallons will spill out of the twenty-gallon tank when the temperature rises to 35 °C?

Chapter 13 (OS College Physics)

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| 1. | *What is the Fahrenheit temperature of a person with a  fever?* [1020F] |
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| 2. | *Frost damage to most plants occurs at temperatures of  or lower. What is this temperature on the Kelvin scale?* [271 K] |
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| 8. | (a) At what temperature do the Fahrenheit and Celsius scales have the same numerical value? (b) At what temperature do the Fahrenheit and Kelvin scales have the same numerical value?  |
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| 15. | Show that 60.0 L of gasoline originally at  will expand to 61.1 L when it warms to  as claimed in Example 13.4. Assume βgas = 950 x 10-6 [C0]-1 |
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| 18. | Most automobiles have a coolant reservoir to catch radiator fluid that may overflow when the engine is hot. A radiator is made of copper and is filled to its 16.0-L capacity when at  What volume of radiator fluid will overflow when the radiator and fluid reach their  operating temperature, given that the fluid’s volume coefficient of expansion is ? [0.475 L] |