Name: _____ Class: _____Date: _____

Heat

Concept Review

Defining Heat PE=mgh KE=1/2m·v^2 ME= PE + KE

1. A 1.000×10^3 kg car is moving at 90.0 km/h (25.0 m/s) as it exits a freeway. The driver brakes to meet the speed limit of 36.0 km/h (10.0 m/s).
   a. What was the car's kinetic energy on the freeway?

   _____

   b. What is its kinetic energy after slowing down?

   _____

   c. Did the internal energy of the car, road, and air increase or decrease in this process? By how much?

   _____

   d. Was work done by the car brakes and other friction forces in the process? How much?

   _____

   _____

2. A 2.00×10^2 kg sled is sliding downhill at a constant speed of 5.00 m/s until it passes a tree 20.0 m down.
   a. What was the potential energy associated with the sled and the sled's kinetic energy and total mechanical energy at the top of the hill?

   _____

   b. What were these energies at the bottom of the hill?

   _____

   c. What was the change in the sled's total energy?

   _____

   d. What was the change in the internal energy of the sled and its environment? How might that change be observed in the snow?

   _____

   _____

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Heat

Math Skills

Temperature and Thermal Equilibrium

1. The temperature at one of the Viking sites on Mars was found to vary daily from –90.0°F to –5.0°C. Convert these temperatures to Kelvin.

_____

2. Mercury boils at 357°C and freezes at –38.9°C.
   a. Convert these temperatures to Kelvin.

_____

   b. Can a mercury thermometer be used to measure temperatures between 500°C and 600°C? between 100°C and 200°C?

_____

_____

3. You walk out of a sauna at 45°C into a tub in which the water temperature is 309 K.
   a. Is your skin initially in thermal equilibrium with the water?

_____

   b. Is your bath going to feel cold or warm?

_____

4. Nitrogen becomes a liquid at –195.8°C under atmospheric pressure. Oxygen becomes a liquid at –183.0°C.
   a. Convert these temperatures to Kelvin.

_____

   b. A sealed tank containing a mixture of nitrogen and oxygen is cooled to 82.8 K and maintained under atmospheric pressure. Are the contents now a liquid or a gas? Explain.

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