NAME _____ DATE _____ CLASS _____

Chapter 10

HOLT PHYSICS

Mixed Review

Heat

1. A small bag containing 0.200 kg of lead shot at a temperature of 15.0°C falls from a 40.0 m high tower. Instead of bouncing back, the bag makes a small hole in the ground. The specific heat of lead is 1.28×10^2 J/kg•°C.

a. Find the initial potential energy of the lead.

b. How much energy did the lead lose as heat?

c. The temperature of the lead after impact was 17.0°C. What was the increase in internal energy of the lead? How does it compare to the amount of lost potential energy?

d. How much internal energy was added to the ground?

2. A very shallow pond contains 1.50×10^5 kg of water at 23°C. At the end of a windy day, 1.00×10^3 kg of water was lost by evaporation. It takes 2.26×10^6 J for 1 kg of water to evaporate.

a. How much energy was removed from the pond by heat of evaporation?

b. How much water was left in the pond?

c. By how much did the temperature of the water drop in the pond? (Hint: the specific heat capacity for water is 4.19×10^3 J/(kg•°C).)

d. Assuming there were no other changes in energy, what was the temperature of the water at the end of the day?

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Chapter 10

HOLT PHYSICS

Mixed Review *continued*

3. Exactly two kilograms of boiling water (100.0°C) are poured into a long, insulated aluminum pipe. The mass of the pipe is 5.000 kg, and its temperature is 20.0°C. The specific heat capacity of water is 4.19×10^3 J/kg•°C, and the specific heat capacity of aluminum is 8.99×10^2 J/kg•°C.

a. Given that the final temperature of the water is x°C and the final temperature of the pipe is y°C, explain why $y = x$.

b. Write expressions for the temperature change in water and in the pipe itself.

c. Write an expression for the amount of energy removed from the water.

d. Write an expression for the amount of energy added to the aluminum.

e. Explain under what conditions these two amounts of energy may be considered equal.

f. Assuming that these conditions are realized, find the final temperature of the water and pipe.

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