

**Concept-Development  
Practice Page** **23-1**

**Change of Phase**

All matter can exist in the solid, liquid, or gaseous phases. The solid phase exists at relatively low temperatures, the liquid phase at higher temperatures, and the gaseous phase at still higher temperatures. Water is the most common example, not only because of its abundance but also because the temperatures for all three phases are common. Study Section 23.8 in your textbook and then answer the following:

1. How many calories are needed to change 1 gram of 0°C ice to water?  
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2. How many calories are needed to change the temperature of 1 gram of water by 1°C?  
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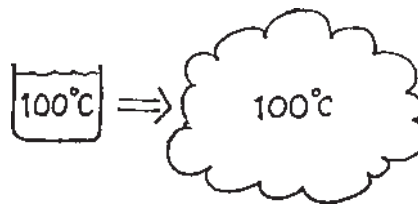
3. How many calories are needed to melt 1 gram of 0°C ice and turn it to water at a room temperature of 23°C?  
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4. A 50-gram sample of ice at 0°C is placed in a glass beaker that contains 200 g of water at 20°C.  
a. How much heat is needed to melt the ice? \_\_\_\_\_

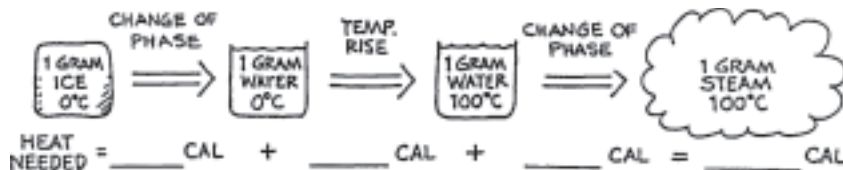


- b. By how much would the temperature of the water change if it gave up this much heat to the ice? \_\_\_\_\_
- c. What will be the final temperature of the mixture? (Disregard any heat absorbed by the glass or given off by the surrounding air.) \_\_\_\_\_



5. How many calories are needed to change 1 gram of 100°C boiling water to 100°C steam?  
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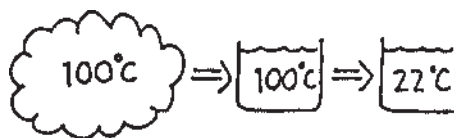
6. Fill in the number of calories at each step below for changing the state of 1 gram of 0°C ice to 100°C steam.



**CONCEPTUAL PHYSICS**

7. One gram of steam at  $100^{\circ}\text{C}$  condenses, and the water cools to  $22^{\circ}\text{C}$ .

a. How much heat is released when the steam condenses? \_\_\_\_\_



b. How much heat is released when the water cools from  $100^{\circ}\text{C}$  to  $22^{\circ}\text{C}$ ?  
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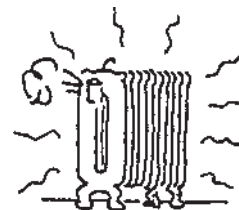
c. How much heat is released altogether? \_\_\_\_\_

8. In a household radiator 1000 g of steam at  $100^{\circ}\text{C}$  condenses, and the water cools to  $90^{\circ}\text{C}$ .

a. How much heat is released when the steam condenses?  
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b. How much heat is released when the water cools from  $100^{\circ}\text{C}$  to  $90^{\circ}\text{C}$ ?  
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c. How much heat is released altogether?  
\_\_\_\_\_



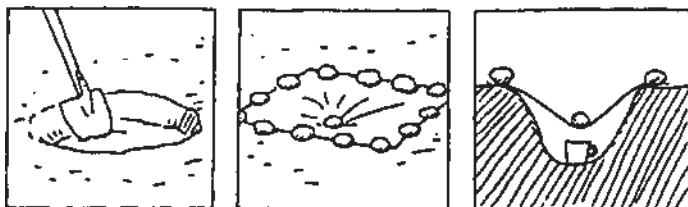
9. Why is it difficult to make tea on the top of a high mountain?  
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10. How many calories are given up by 1 gram of  $100^{\circ}\text{C}$  steam that condenses to  $100^{\circ}\text{C}$  water?  
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11. How many calories are given up by 1 gram of  $100^{\circ}\text{C}$  steam that condenses and drops in temperature to  $22^{\circ}\text{C}$  water?  
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12. How many calories are given to a household radiator when 1000 grams of  $100^{\circ}\text{C}$  steam condenses, and drops in temperature to  $90^{\circ}\text{C}$  water?  
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13. To get water from the ground, even in the hot desert, dig a hole about a half meter wide and a half meter deep. Place a cup at the bottom. Spread a sheet of plastic wrap over the hole and place stones along the edge to hold it secure. Weight the center of the plastic with a stone so it forms a cone shape. Why will water collect in the cup? (Physics can save your life if you're ever stranded in a desert!)



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### CONCEPTUAL PHYSICS