**Chapter 21 Heading**: \_\_\_\_\_\_\_

**Heading 21.1**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Temperature & Kinetic Energy**: (*Write a phrase of summary*.)

**Heading 21.2**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Summarize figure 21.3**

**Heading 21.5**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Summarize figure 21.5**

**Summarize Computational Example & answer the question**

**Heading 21.6**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Answer the question**

**Summarize Computational Example**

**Heading 21.7**: \_\_\_\_\_ (*Write a phrase of explanation*.)

**Heading 21.8**: \_\_\_\_\_ (*Write a phrase of explanation and write & define the boldfaced words*.)

**Heading 21.9**: \_\_\_\_\_ (*Write a phrase of explanation*.)

**Summarize figure 21.13**

**Summarize figure 21.15**

**Summarize figure 21.16**

**Review Questions**

1. How is temperature commonly measured?

2. How many degrees are between the melting point of ice and boiling point of water on the Celsius scale?

4. In terms of differences in temperature between objects in thermal contact, in what direction does heat flow?

9. What does it mean to say that a material has a high or low specific heat capacity?

10. Do substances that heat up quickly normally have high or low specific heat capacities?

11. How does the specific heat capacity of water compare with that of other common substances?

12. Why is the North American west coast warmer in winter months and cooler in summer months than the east coast?

14. Which expands most for increase in temperature: solids, liquids, or gases?

15. At what temperature is the density of water greatest?

16. Ice is less dense than water because of its open crystalline structure. But why is water at 0⁰ C less dense than water at 4⁰ C?

17. Why do lakes and ponds freeze from the top down rather than from the bottom up?

19. Calculate the number of calories of heat needed to change 500 grams of water by 50⁰ C.

20. Calculate the number of calories given off by 500 grams of water cooling from 50⁰ C to 20⁰ C.

21. A 30-gram piece of iron is heated to 100⁰ C and then dropped into cool water where the iron’s temperature drops to 30⁰ C. How many calories does it lose to the water (The specific heat capacity of iron is 0.11 cal/g ⁰C.)

22. Suppose the same 30-gram piece of iron is dropped into another container of water and gives off 165 calories in cooling. Calculate the iron’s temperature change.

23. What mass of water will give up 240 calories when its temperature drops from 80⁰ C to 68⁰ C?

24. When a 50-gram piece of aluminum at 100⁰ C is placed in water, it loses 735 calories of heat while cooling to 30⁰ C. Calculate the specific heat capacity of the aluminum.

26. If you stake out a plot of land with a steel tape measure using map measurements on a very hot day, will you enclose more or less land than on a very cold day?



27. When cool, the ball will pass through the ring. Will it pass through the ring if the ball is heated? Will the ball pass through if the ring is heated? What happens to the size of the hole when heated (increase, decrease, remain the same)?

28. Describe what happens to a steel pipe that is heated. Cooled.

30. Explain why when biting into a hot pizza, the sauce burns one’s mouth, but the dough does not.

32. A watermelon and some sandwiches are removed from a picnic cooler on a very hot day. Which will remain cool for a longer time?

33. Iceland, so named to discourage conquest by expanding empires, is not at all ice-covered like Greenland and parts of Siberia, even though it is nearly on the Arctic Circle. The average winter temperature of Iceland is considerably higher than regions at the same latitude in eastern Greenland and central Siberia. Explain why this is so.

34. During the winter in colder climates, it is important to not allow the temperature in one’s house to go below freezing. Why? (Hint: think of the water pipes in the house.)

37. State whether water will expand, contract, or remain the same size when warmed up from 0⁰ C, 4⁰ C, 10⁰ C.

**Chapter 22 Heading**: \_\_\_\_\_\_\_

**Heading 22.1**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Summarize figure 22.2**

**Summarize figure 22.3**

**Answer the questions**

1.

2.

3.

**Heading 22.2**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Summarize figure 22.5**

**Summarize figure 22.6**

**Winds**: **Summarize figure 22.7**

**Why Rising Warm Air Cools**: (*Write a phrase of explanation*.)

**Summarize figure 22.9**

**Answer the question**

1.

**Heading 22.3**: \_\_\_\_\_ (*Write the boldface words with a phrase of explanation*.)

**Summarize “Doing Physics”**

**Review Questions**

3. What is the difference between a conductor and an insulator?

4. Why are materials such as wood, fur, feathers, and even snow good insulators? Also, electric wires are often kept on top of tall poles for the same reason.

7. Why does the direction of coastal winds change from day to night?

8. How does the temperature of a gas change when it is compressed? When it expands?

12. Why does a good absorber of radiant energy appear black?

13. Why do eye pupils appear black?

15. Which will normally cool faster, a black pot of hot tea or a silvered pot of hot tea?

21. At what common temperature will both a block of wood and a piece of metal feel neither hot nor cool when you touch them with your hand?

22. If you place a metal rod in a snow bank, the end of the rod you are holding will soon become cold. Does the cold flow from the snow to your hand or from your hand to the snow?

24. Notice that a desk lamp often has small holes near the top of the metal lampshade. How do these holes keep the lamp cool?

25. When a space shuttle is in orbit and there appears to be no gravity in the cabin, a candle cannot stay lit. Explain.

**Chapter 23 Heading**: \_\_\_\_\_\_\_

**Review Questions**

2. What is evaporation, and why is it also a cooling process?

3. Why does a dog pant on a hot day?

5. Why is being burned by steam more damaging than being burned by boiling water?

6. Which usually contains more water vapor – warm air or cool air?

7. Why does warm moist air form clouds when it rises in altitude?

8. Why do you feel less chilly if you dry yourself inside the shower stall after taking a shower rather than in the open air of the bathroom?

10. What is the difference(s) between evaporation and boiling?

17. Does water vapor give off or absorb energy when it turns into a liquid? What is this process called?

20. Why is it important that a finger be wet before touching a hot clothes iron to test if it is ready to use?

**Chapter 24 Heading**: \_\_\_\_\_\_\_

**Heading 24.3**: \_\_\_\_\_ (*Write the boldface word with a phrase of explanation*.)

**Summarize figure 24.3**

**Summarize figure 24.5 and the paragraphs next to it.**

**Summarize figure 24.6**

**Review Questions**

1. What is the meaning of the Greek words from which we get the word “thermodynamics”?

6. What happens to the internal energy of a system when work is done on it? What happens to its temperature?

13. How does the second law of thermodynamics relate to the direction of heat flow?

18. Why are heat engines intentionally run at high operating temperatures?

22. What is the physicist’s term for a measure of messiness?