

5—Change of Phase

A ¹Rub your hands together quickly for 10 seconds then hold them to your face. ²Notice how warm your palms feel. ³When you rubbed your hands, you created *friction*. ⁴Friction produces **heat**, a form of energy.

B ⁵It took muscle energy to move your hands. ⁶Was the muscle energy changed into heat energy when you rubbed your palms together?

C ⁷When you rub your hands together quickly, the atoms that make up your skin move faster. ⁸As they do, they produce friction, and friction produces heat. ⁹Therefore, your palms get warmer. ¹⁰Heat can also come from other sources, such as fire, the sun, or an electric stove. ¹¹When heat from any source

is applied to a substance, the atoms in that substance speed up and the substance gets warmer.

You put a warm substance in the refrigerator. Is heat removed from the substance? What happens to the speed of the atoms?

D ¹²The atoms of a solid normally move very little. ¹³As you add more heat to a solid, its atoms move faster and faster. ¹⁴When enough heat is added, the solid melts. ¹⁵That means that when enough heat is applied to a solid, it changes state from a solid to a liquid. ¹⁶This change in state from solid to liquid is called **melting**. ¹⁷Think of a similar definition for *freezing*.

E ¹⁸When there is a change in state because atoms have speeded up or

slowed down, scientists say that there has been a **change in phase**.

F ¹⁹Now think about liquids. ²⁰If enough heat energy is applied to a liquid, it will become a gas. ²¹As water is heated, it gets hotter and hotter until it boils. ²²A gas called water vapor is produced. ²³If the water is left to boil long enough, all the water will vaporize. ²⁴**Vaporization** is the change in phase from a liquid to a gas.

G ²⁵Sometimes a gas will lose heat and return to liquid. ²⁶Think of a hot shower. ²⁷The hot water produces a lot of water vapor. ²⁸You may have seen what happens when hot water vapor touches a cold surface like a bathroom mirror! ²⁹The vapor cools and changes into a liquid. ³⁰The change in phase from a gas to a liquid is called **condensation**.

H ³¹A **line graph** shows how one thing affects another over a period of time. ³²The line graph below shows what happens when you deposit 5 dollars a month in a savings account. ³³Think about how much money you save as time goes by. ³⁴How much money do you save in 3 months?

