

# MEET AND GREET HEAT

The highest temperature ever recorded on Earth was 134°F (56.7°C), at Death Valley, California, in 1913.

Think of the Sun as a gigantic furnace that pumps heat and light in all directions. Less than a billionth of the Sun's heat and light energy actually reaches the Earth. A lot of the energy that does reach the Earth bounces back into space. Most of what doesn't bounce back is absorbed by the atmosphere and heats the air.

SUN →  
SUN'S ENERGY  
← EARTH

# WATER FALLS

Precipitation (pre-sip-uh-TAY-shin) is water that falls from the sky. Rain, snow, sleet, and hail are different forms of precipitation and different forms of water. Water can be a solid, a liquid, and a gas. Water falls to Earth, where it is heated by the Sun and changed into water vapor. The water vapor returns to the atmosphere and forms clouds.

# WHETHER THE WEATHER BE WINDY...

When the Sun heats the air, the air expands and rises like a balloon. As the heated air rises, colder air rushes in and takes its place. Then the warm air cools down and falls back toward the Earth. This cycle of heating and cooling, rising and falling, is called *convection*. Convection creates large masses of moving air, called wind. Machines, called wind turbines, convert wind energy into electricity.

WIND TURBINES →

The highest wind speed ever recorded on Earth was 318 mph during a tornado in Oklahoma!

# OR WHETHER THE WEATHER GETS WET

## RAIN

Raindrops form in clouds, one tiny droplet at a time. They begin to take shape when the water vapor in the cloud sticks to a speck of dust, smoke, or salt. Inside the cloud, the heaviest droplets fall slowly. Then air inside the cloud pushes the droplets up again. More water droplets join together to get bigger and heavier until the droplets become heavy enough to fall from the cloud.

## SNOW

Snowflakes are made of tiny crystals of frozen water vapor that form around bits of dirt or dust, like raindrops do. Snow crystals grow until they're heavy enough to begin their trip to the ground.

No two snowflakes are identical, because every snowflake takes its own path from the clouds to the Earth.

## SLEET

If partially melted snowflakes or raindrops fall through a layer of air near the ground that is colder, they can freeze again and turn to sleet, also known as freezing rain. Sleet is made up of clear pellets of ice.

# WEATHER ACTING WILD

## HURRICANES

Hurricanes start over warm ocean water when a group of big thunderstorms comes together and the wind picks up speed. Once the winds reach 74 mph, what was called a tropical storm becomes an official hurricane.

Since 1979, hurricanes have been identified by both men's and women's names. They are always named in alphabetical order. (But Q, U, and Z aren't used.)

## LIGHTNING

When it's hot out and the ground heats up quickly, bubbles of hot air float up and create convection currents. As air molecules crash into each other, negatively charged electrons are knocked off, and they collect at the bottom of a cloud. Lightning, an intense electrical current, travels from the negatively charged cloud to the positively charged ground.

Lightning is hotter than the surface of the Sun, and the superheated air around it expands so fast it explodes. We call that explosion thunder.

## TORNADOES

Tornadoes can happen when the energy inside a cloud creates an updraft—a sucking in and up of air. All the air pulled up into the cloud spins and twists, and you have a tornado. Winds inside a tornado can spin at more than 300 mph!

# MEET THE METEOROLOGIST

The study of weather is called meteorology (MEET-ee-er-OL-uh-jee). Scientists who examine the weather and predict how it will change are called **METEOROLOGISTS**. Meteorologists use Doppler radar, weather satellites, and computers to tell them what's happening on and around Earth.

WEATHER SATELLITE

Weather stations launch weather balloons every day. These special balloons tell meteorologists about temperature, humidity, and wind speed.

THERE ARE PLENTY OF EXPERIMENTS YOU CAN DO LIKE A METEOROLOGIST. USE YOUR WEATHER LAB TO TRY THE PROJECTS ON THE FLIP SIDE OF THIS BOOKLET.



# EXPERIMENT #1: WEATHER WATCHING

Try making your own weather observation chart to find patterns in your local weather.

| WEATHER OBSERVATION CHART |      |             |            |                |          |            |
|---------------------------|------|-------------|------------|----------------|----------|------------|
| DATE                      | TIME | TEMPERATURE | WIND SPEED | WIND DIRECTION | RAINFALL | CLOUD TYPE |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |
|                           |      |             |            |                |          |            |

## REMEMBER:

DO YOUR READINGS AT THE SAME TIME AND PLACE EACH DAY.

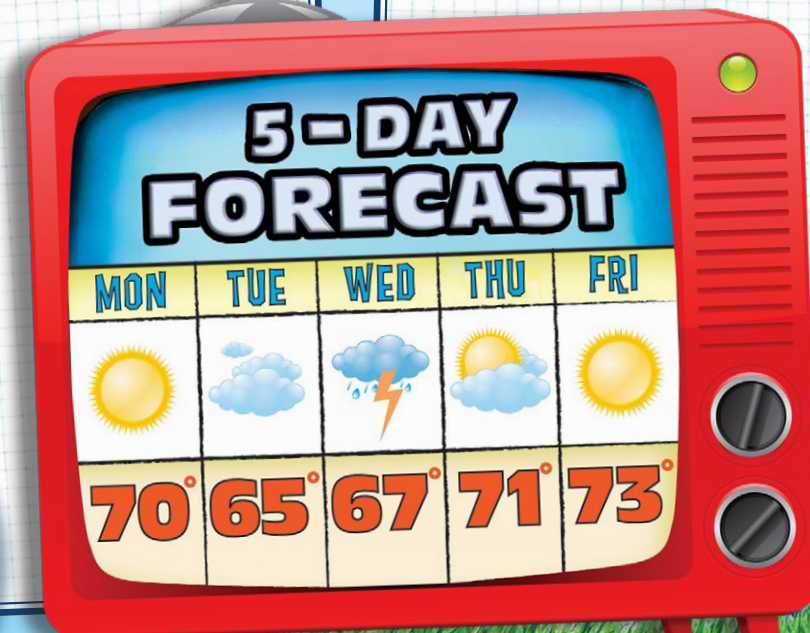
- 1 AFTER A MONTH, TAKE A LOOK AT YOUR DATA:  
CAN YOU FIND ANY PATTERNS?
- 2 DID IT RAIN MORE WHEN IT WAS WARMER  
OR WHEN IT WAS COOLER?
- 3 IS THERE A CONNECTION BETWEEN THE  
TEMPERATURE AND THE WIND SPEED?

# EXPERIMENT #2: TAMING THE WIND

Is there any connection between the wind's direction and the weather?

- 1 MAKE A NEW WEATHER OBSERVATION CHART THAT GIVES YOU PLACES TO RECORD WIND DIRECTION TWO OR THREE TIMES EACH DAY.
- 2 RECORD WIND DIRECTION TWO OR THREE TIMES EVERY DAY FOR THE NEXT WEEK.
- 3 COMPARE THE WIND DIRECTION WITH THE WEATHER YOU'VE RECORDED.
- 4 WHAT HAPPENED TO THE WEATHER WHEN THE WIND CHANGED DIRECTION?

Never take readings or measurements during stormy weather. Stay inside instead.



# EXPERIMENT #3: WEATHERMAN FACE-OFF

Find out if the meteorologists on the local TV news or in the paper are right.

- 1 KEEP TRACK OF THEIR PREDICTIONS.
- 2 MATCH THEM TO THE READINGS YOU TAKE WITH YOUR WEATHER LAB.
- 3 CAN YOU USE YOUR DATA TO PREDICT TOMORROW'S WEATHER?
- 4 DO YOU AGREE WITH THE METEOROLOGISTS?

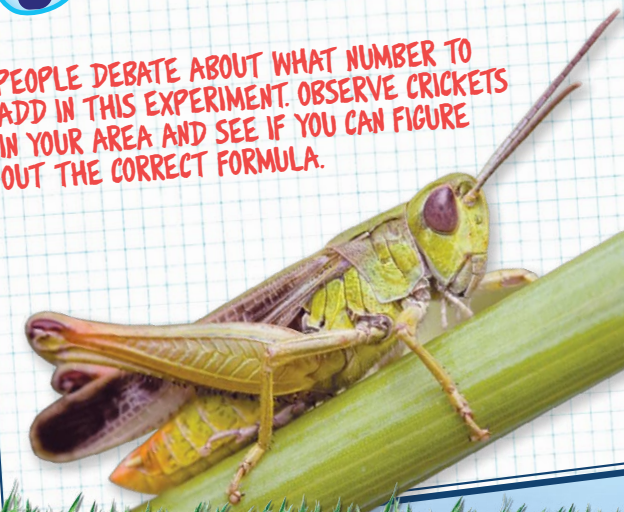
A cartoon character named Woolly Lamb gave one of the very first TV weather forecasts in the United States on October 14, 1941.

# EXPERIMENT #4: SIX-LEGGED THERMOMETERS

Did you know crickets can be accurate thermometers?

- 1 COUNT HOW MANY TIMES A CRICKET CHIRPS IN 15 SECONDS.
- 2 ADD 37.
- 3 THE TOTAL IS THE TEMPERATURE IN DEGREES FAHRENHEIT.

PEOPLE DEBATE ABOUT WHAT NUMBER TO ADD IN THIS EXPERIMENT. OBSERVE CRICKETS IN YOUR AREA AND SEE IF YOU CAN FIGURE OUT THE CORRECT FORMULA.



# EXPERIMENT #5: OPERATION GREEN PLANET

Recently, the amount of gases that trap heat in the atmosphere has increased. This is what people call **GLOBAL WARMING**. If the Earth's temperature gets a lot hotter, the Earth's glaciers could melt, causing the ocean to rise. The melting glacier water could eventually flood the planet.



Most scientists believe human activity has caused this increase. But the good news is that there are things you can do to slow global warming. Here are some ideas for your final experiment:

- When you can, walk, use your bicycle, ride in a carpool, or take the bus.
- Plant more trees. They absorb carbon dioxide from the air.
- Recycle cans, glass, plastic bottles and bags, newspapers, and cardboard.
- Turn off lights, the television, and the computer when you finish using them.

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# RAIN OR SHINE!

DON'T COMPLAIN ABOUT THE WEATHER.  
DO SOMETHING ABOUT IT.

Rain or snow, fog or sunshine, no matter where you live, the weather affects you every day. That's why the study of weather is so important. With the help of your You-Track-It Weather Lab and this booklet, you'll learn how weather happens. When you're done, you'll be able to track the wind, chart temperature changes, and measure rainfall.

