

Lesson 3: Heat and Temperature (2 Days)

Getting Started

✿ Questions to Explore

- How does the weather affect living things?
- Why do we study and observe the weather?
- What causes the weather?
- How is weather measured?
- Why does the weather change?



Facts and Definitions

- The Sun heats the Earth.
- A **thermometer** is a tool used to find the temperature of something.

⦿ Skills

- Discuss and determine how energy from the Sun warms the land, air, and water. (S)
- Describe weather using quantitative measures of temperature, wind direction, wind speed, and precipitation. (S)
- Gather information using simple equipment and tools. (S)
- Observe and record weather changes over time and relate to time of day and year. (S)

✂ Materials

- *The Kids' Book of Weather Forecasting* by Mark Breen and Kathleen Friestad
- colored pencils or markers
- construction paper* (Activity 4 - optional)
- glue* (Activity 4 - optional)
- scissors* (Activity 4 - optional)
- thermometer (kit)

Introduction

Ask your child where heat comes from and what makes the weather warm. Explain that all of our heat comes from the Sun's energy. The Sun is millions of miles away, but its energy passes through space to reach us eight minutes later. Some of that energy we see as light, but a lot of it we cannot see. When the Sun's energy is absorbed by the Earth, it warms the Earth.

Reminder:

1. Fill out your weather log each day as outlined in Lesson 1.
2. Record the air pressure as outlined in Lesson 2.

Activities

Reading and Questions

Ask your child to read all of pages 31-32 ("The Energetic Sun") and the "Fahrenheit and Celsius" section on p. 35 of *The Kids' Book of Weather Forecasting*. Ask her to answer the following questions.

1. Why does the Earth receive only a little bit of the Sun's energy?

The Sun is very far (millions of miles) away.

2. What are some things that affect how much of the Sun's warmth we feel?

Answers may include clouds (that block the Sun), ice or snow (that reflect the heat back to space), or bare soil or ground (that absorb heat). Your child may also mention the time of day or season.

3. What would happen to the Earth if there were no Sun?

The book mentions that there would be no weather and that everything would freeze. Your child may have other ideas as well.

Activity 1: Thermometers and Temperature

Tell your child that we use a tool called a **thermometer** to measure the temperature in the environment. We use two scales to record the temperature. Celsius is the form of measurement used by scientists and by most countries. It is also called the metric unit. On this scale, freezing is at 0 degrees and boiling is at 100 degrees. The other scale, which the United States uses, is called Fahrenheit. It is also called the customary unit. Water freezes at 32 degrees on this scale and boils at 212 degrees. If your child would like to know how to change from Celsius to Fahrenheit or vice versa, encourage her to read the yellow box on p. 35 of the book.

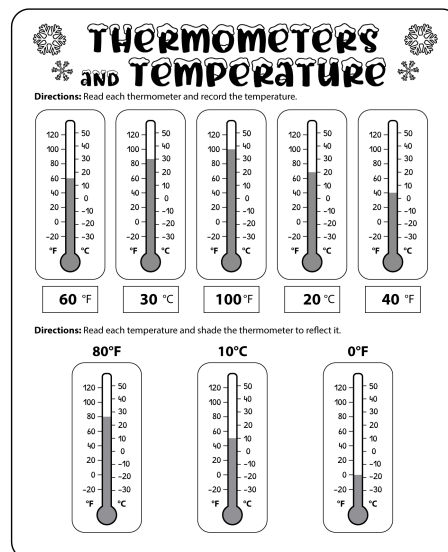
Give your child a thermometer and let her examine it. Ask her how she can tell whether it shows Fahrenheit, Celsius, or both. Let her find 32°F and 212°F, and then 0°C and 100°C (help her as needed).

Show your child the thermometers on the "Thermometers and Temperature" page (Option 1 or 2), and review the two scales with her. As needed, explain the degree symbol to her (°). Let her read each thermometer and write the temperature on the top set. On the bottom set, she should read the temperature and shade the thermometer to reflect the given temperature. Choose an option for your child to complete. Option 2 is more challenging.

Option 1

This page has temperatures that fall at standard increments on the scale.

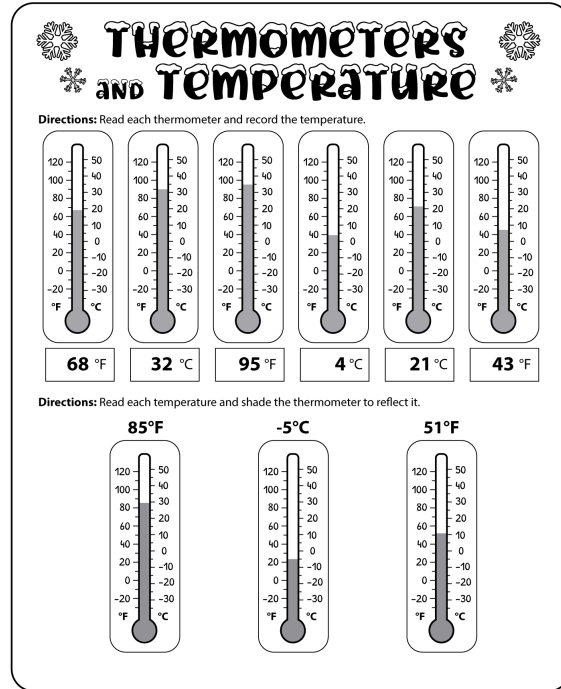
"Thermometers and Temperature" Option 1 Answer Key



Option 2

These temperatures do not all fall at standard increments, so your child must be able to estimate the temperature by finding the distance between the two numbers.

"Thermometers and Temperature" Option 2 Answer Key



Activity 2: Crickets and Temperature

Review how to read thermometers with your child. Explain that there is an unusual formula for figuring out the temperature without using a thermometer. Cricket chirps can be used to measure temperature! Read the bottom of p. 37 in the book with your child. Encourage her to record the information on a sheet of paper.

Next, give your child the "Crickets and Temperature" page, and ask her to determine the temperature according to the number of chirps for each example. She can write the degrees and shade the thermometer.

Answer Key:

1. 72
2. 97
3. 62
4. 73

Day 2

Reminder:

1. Fill out your weather log each day as outlined in Lesson 1.
2. Record the air pressure as outlined in Lesson 2.

Activity 3: Daily Temperature Experiment

Tell your child to pretend that she has been asked to plan an outdoor party. The party should happen at the warmest time of the day because people may get wet (in warm weather) or people must stay warm (in cool weather). Decide which scenario is appropriate for the time of year. Ask how she could figure out the warmest time of day.

For this experiment, your child will record the temperature four times a day for five days (they do not need to be consecutive). Explain that when conducting an experiment, you start with a question (problem), think about everything you already know about your question and experiment, and make a hypothesis (a good guess about what will happen).

The question for this experiment is: "What is the warmest time of day?" Allow your child to circle the season. Help her look up when the sun rises and sets at this time of year (most online local weather forecasts should have this information). Ask her how this information (the season and the rising and setting of the sun) might influence when the warmest time of day will be. She can use this information to form a hypothesis. Ask her to record her hypothesis on the activity page.

Tell her that the next step is listing the materials she will need. For this experiment, your child will need a thermometer, the "Daily Temperature Experiment" data page, and a pencil. Help her record her materials as needed. Then she will conduct the experiment and record the data. Remind her to check the temperature in the shade.

At the end of the experiment, she must figure out which time of day was the warmest. Ask her how she can figure this out based on her data. She might do this by circling the warmest temperature each day in red and then looking for a pattern of warm temperatures. She can record her results on the activity page.

After your child has analyzed her data, ask her the following questions:

- In the summer, what time of day would you not want to run on a track outside?
- In the winter, what time of day might be the best time to play on the playground?
- If you were going to dry your clothes on a clothesline, what would be the best time of day to have them outside?

Activity 4: What Should I Wear?

Tell your child that when she wakes up in the morning, she may hear the temperature on the radio or on TV. How does that help her know what to wear? Explain to her that as she becomes familiar with temperatures, she will be able to know what to wear. Give your child the "What Should I Wear?" page. Ask her to read the temperatures on each thermometer and draw and color the appropriate clothing. If she prefers, she can cut the clothing from construction paper and glue it on the child. Next, ask her to draw what the environment might look like on a day with that temperature.

Activity 5: Temperature and Activities

Help your child look on the Internet for the average temperature for each month of the year in your town (try searching "Average monthly temperature [city, state]"). If you cannot find this information, guess the monthly averages based on what you know about the temperatures in your area. On the "Temperature and Activities" page, ask your child to select one month from each season, record its average temperature, and then write down an activity appropriate for that month. Remind her that the weather changes month to

month and that the temperature affects our activities. Some activities can be done only at certain times of the year.



The Weather Channel

www.beyondthepage.com/link/12856/

The Weather Channel is one possible source for average temperature information. Enter the city and state or zip code for your location. This will bring up a variety of weather information. Click the "Monthly" menu, and then scroll down to the "Monthly Average/Record Temperatures" chart. The chart shows you the average high temperature and average low temperature for the location you entered for each month of the year.

Wrapping Up

Ask your child to describe how temperature is measured. Then ask her how knowing the temperature helps us to make decisions. Let her tell you about some of her favorite activities during different seasons.

Life Application

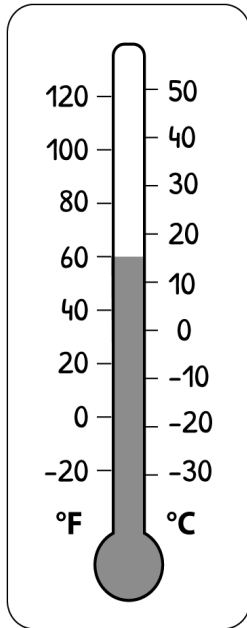
Encourage your child to try to guess the temperature each day before she measures it. How close can she get to the true temperature?



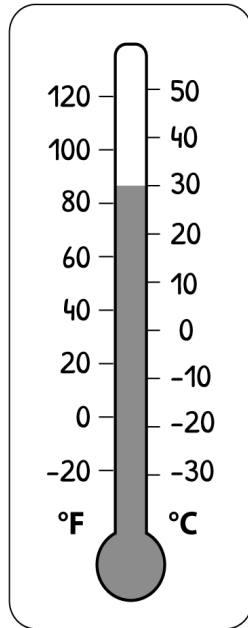
THERMOMETERS AND TEMPERATURE



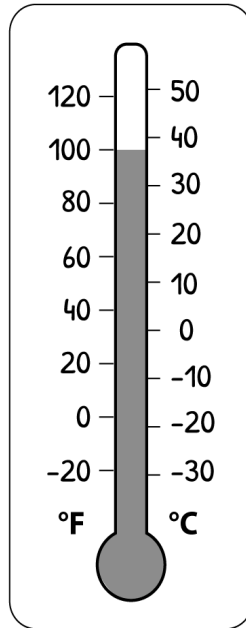
Directions: Read each thermometer and record the temperature.



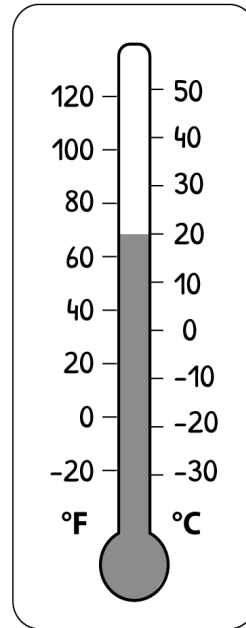
°F



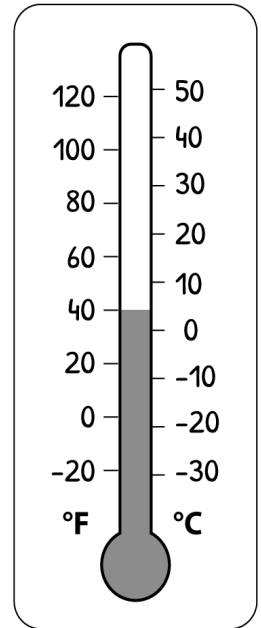
°C



°F

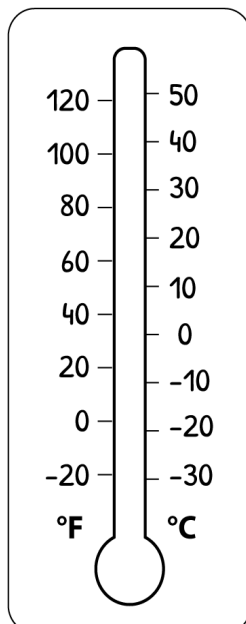
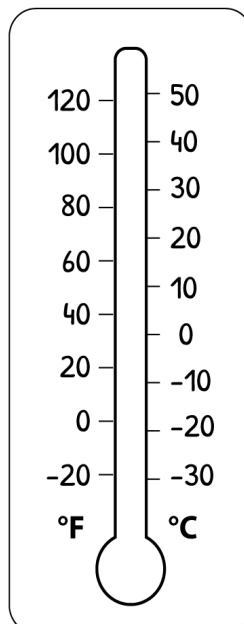
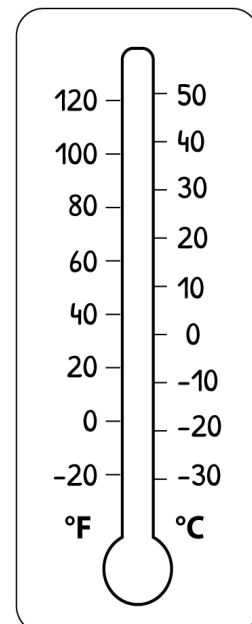


°C



°F

Directions: Read each temperature and shade the thermometer to reflect it.

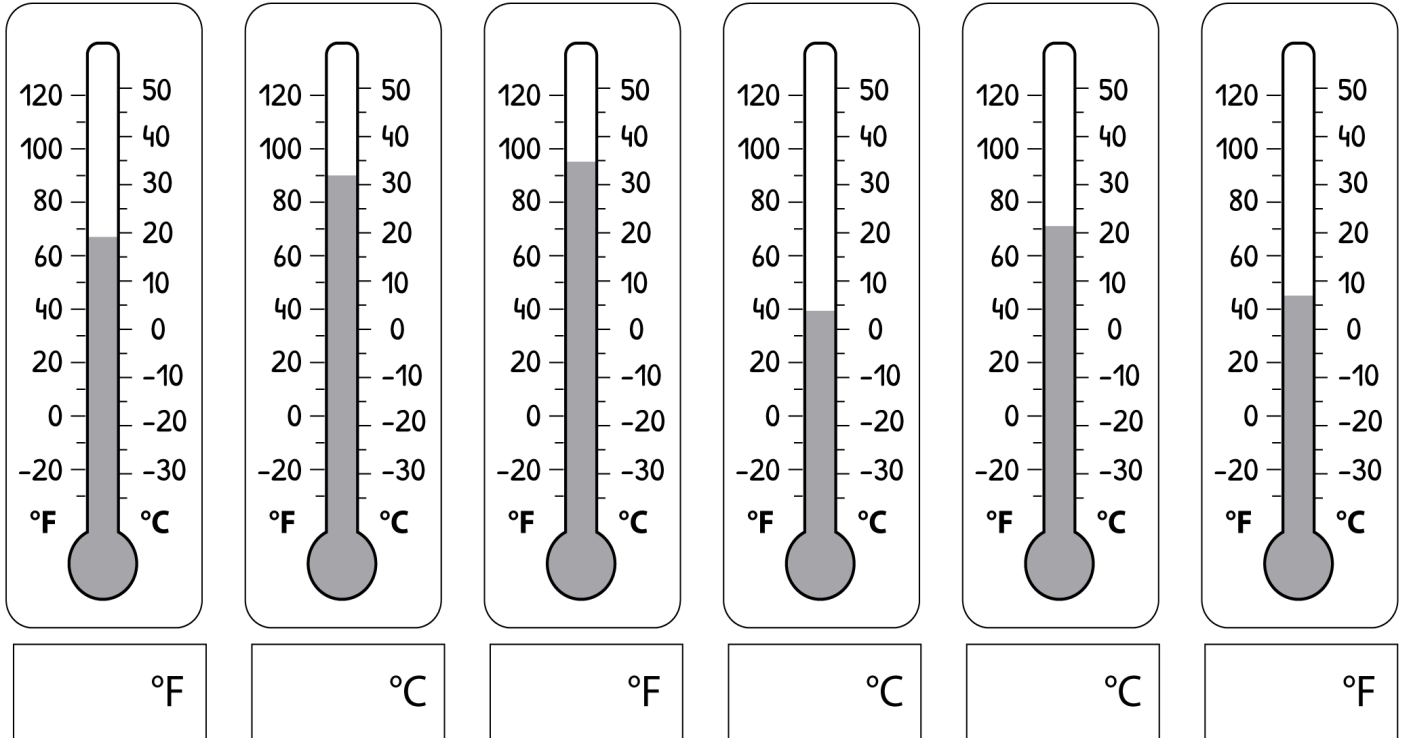
80°F**10°C****0°F**



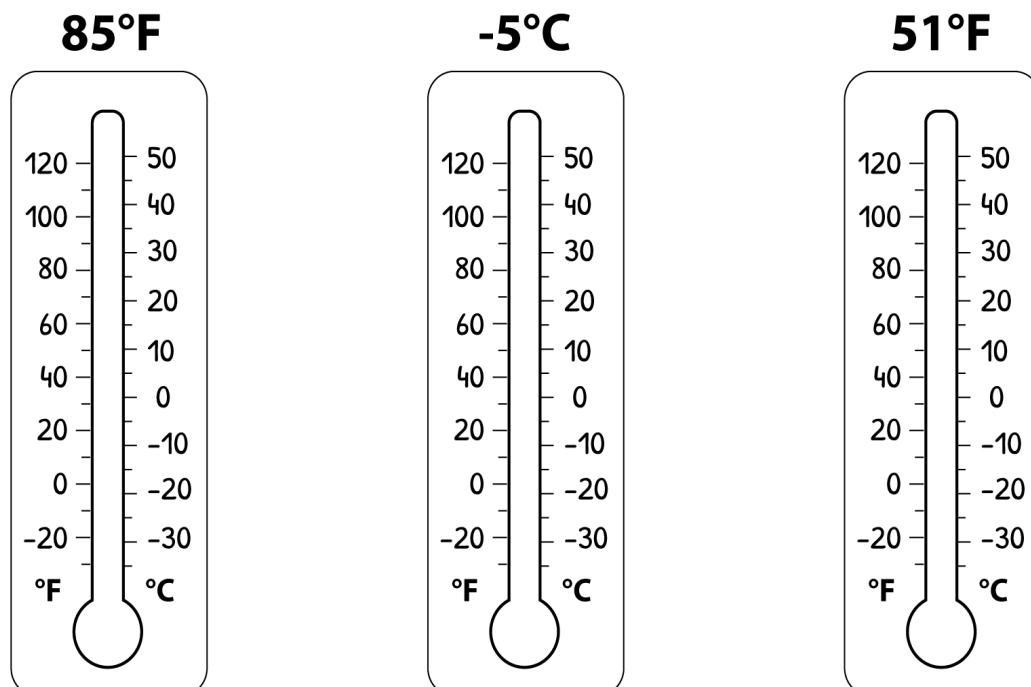
THERMOMETERS AND TEMPERATURE



Directions: Read each thermometer and record the temperature.



Directions: Read each temperature and shade the thermometer to reflect it.



Crickets and Temperature

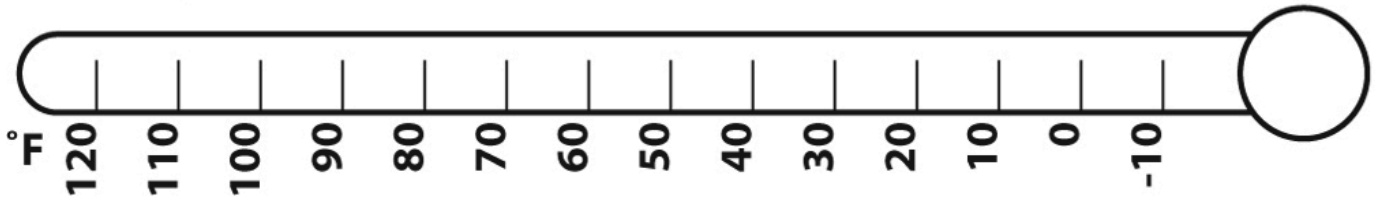
Directions: Use the number of cricket chirps to determine what the temperature would be. Then record the temperature on the thermometer.

1) 32 chirps in 13 seconds



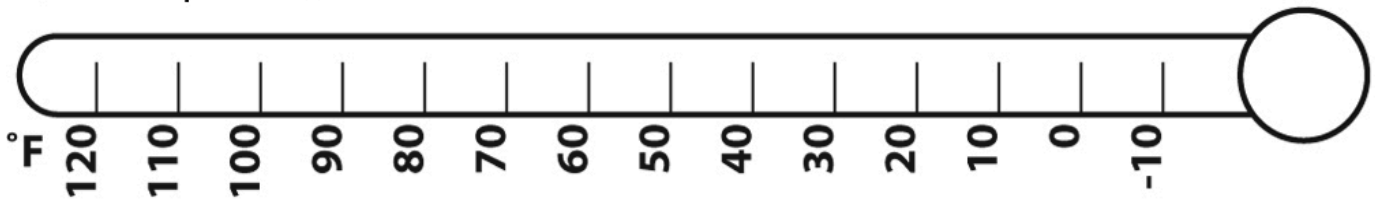
Temperature is _____ °F

2) 57 chirps in 13 seconds



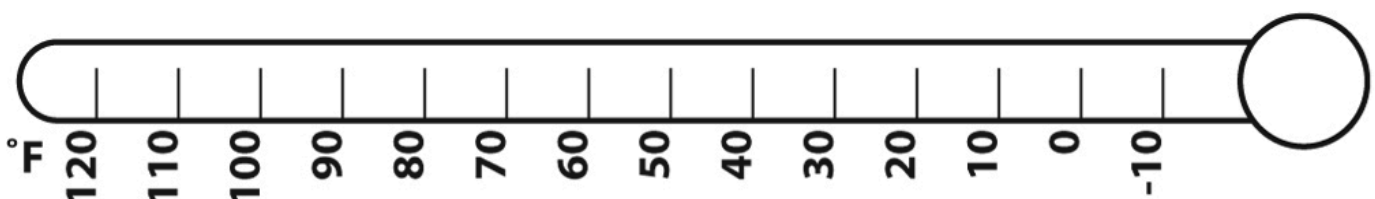
Temperature is _____ °F

3) 44 chirps in 26 seconds



Temperature is _____ °F

4) 66 chirps in 26 seconds



Temperature is _____ °F

DAILY TEMPERATURE EXPERIMENT

Directions: Record the temperature for four times of day over the next five days and record the results.

Question (Problem): What is the warmest time of day?

What I know: The season is (circle one): spring summer fall winter

The sun rose today at: _____ am

The sun will set today at: _____ pm

Hypothesis (Guess): I think _____ is the warmest time of day.

Materials: _____

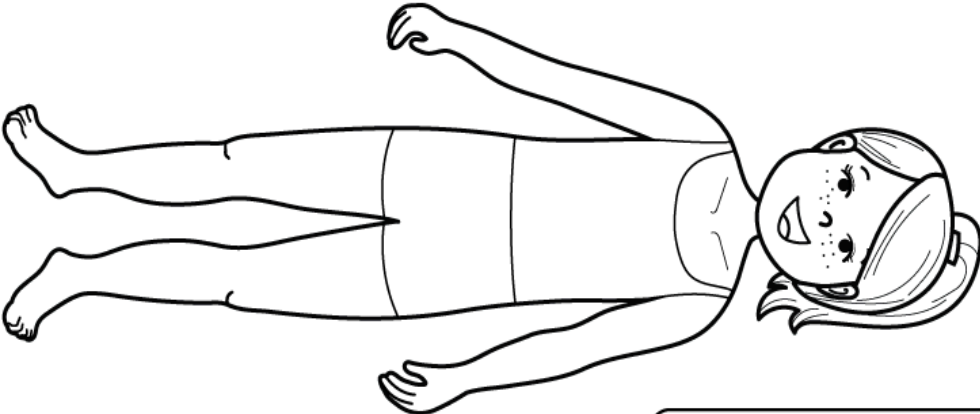
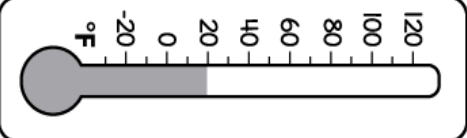
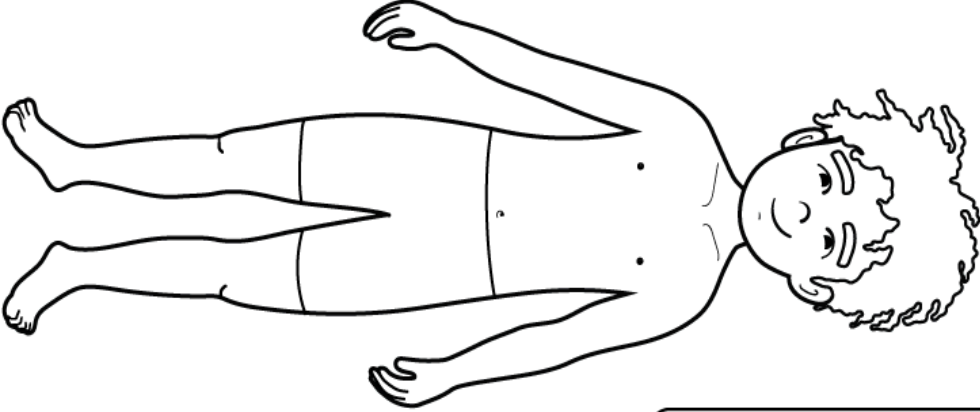
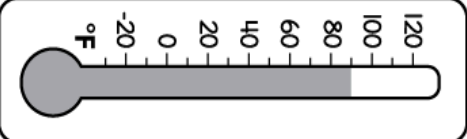
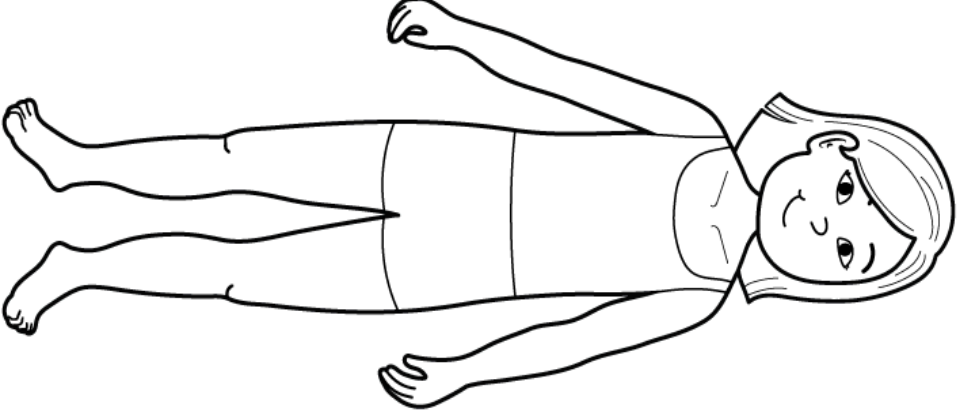
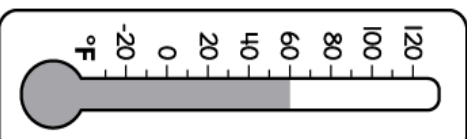
Data: Record the temperature four times each day for five days.

	9:00 a.m.	12:00 noon	3:00 p.m.	6:00 p.m.
Day 1				
Day 2				
Day 3				
Day 4				
Day 5				

Results: _____

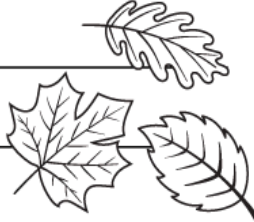
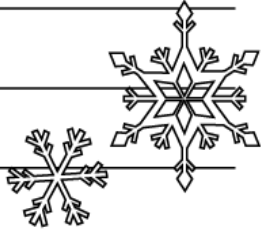
What Should I Wear?

Directions: Read the temperatures. Draw and color clothing appropriate for the weather. Also draw what the environment might look like on a day with the given temperature.

 	 	 
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Temperature and Activities

Directions: Look on the Internet to find the average temperature for each month of the year in your town. Record the information for one month from each season.

SUMMER MONTH: _____ ACTIVITY: _____ _____ _____ _____ _____ 	FALL MONTH: _____ ACTIVITY: _____ _____ _____ _____ _____ 
WINTER MONTH: _____ ACTIVITY: _____ _____ _____ _____ _____ 	SPRING MONTH: _____ ACTIVITY: _____ _____ _____ _____ _____ 