Midland Precipitation

Data Table: Measured Precipitation (inches) at Midland, Michigan

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1981	0.4	1.8	0.4	3.9	2.5	3.5	1.1	4.5	6.0	3.2	2.0	0.7	29.9
1982	1.4	0.5	2.2	1.0	2.6	5.4	2.5	1.4	2.4	0.7	3.5	3.2	26.7
1983	0.8	0.8	2.9	3.8	5.8	2.6	1.3	2.8	5.6	2.6	2.3	1.9	33.1
1984	0.5	0.5	2.2	3.6	4.4	3.9	1.2	1.4	3.5	3.6	2.2	3.9	30.9
1985	1.4	2.2	4.2	3.7	2.7	1.8	2.8	4.7	7.3	3.0	4.6	1.1	39.4
1986	0.6	2.3	1.9	2.5	3.1	2.8	1.6	2.6	18.4	2.2	0.5	1.2	39.5
1987	1.2	0.1	1.4	2.0	1.5	1.9	0.6	5.8	5.1	2.4	2.5	2.6	27.1
1988	1.5	0.9	2.0	3.0	0.4	0.7	3.3	6.2	4.8	3.6	4.4	1.2	31.8
1989	0.8	0.4	2.2	1.6	5.6	3.1	0.4	2.8	2.3	2.2	2.5	0.7	24.5
1990	2.0	1.9	2.3	2.7	4.5	1.8	2.0	3.2	3.3	5.5	5.6	2.5	37.5
1991	1.1	0.9	4.4	5.5	4.2	1.2	4.7	3.2	1.5	4.4	3.0	1.4	35.5
1992	1.4	1.6	2.0	5.4	1.1	2.9	3.9	3.4	5.9	2.3	5.4	1.8	37.1
1993	3.0	0.9	0.9	4.1	2.9	3.4	1.8	4.0	2.9	3.6	2.0	0.5	29.6
1994	2.3	1.2	1.3	4.6	2.3	4.7	4.7	4.0	1.7	2.1	4.9	0.9	34.7
1995	2.0	0.4	1.7	3.0	1.6	1.5	2.6	4.8	1.6	2.4	4.7	1.1	27.4
1996	1.4	1.6	0.7	3.1	3.8	9.1	4.4	1.7	3.9	2.9	1.3	2.6	36.5
1997	2.3	3.9	2.2	1.2	3.3	1.3	2.7	4.0	3.6	1.4	1.4	0.6	27.9
1998	3.5	1.6	5.5	1.1	2.1	1.6	1.3	2.2	2.6	3.1	1.8	1.2	27.5
1999	4.0	0.8	0.9	4.1	2.7	3.0	4.5	1.9	3.1	1.3	0.5	2.5	29.3

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2000	1.2	2.4	1.2	3.1	6.3	3.2	1.9	4.5	3.3	1.9	2.6	2.3	33.9
2001	1.2	3.2	0.3	2.0	3.9	2.7	1.7	3.5	4.5	4.6	1.9	1.6	31.0
2002	1.1	2.3	2.7	4.0	4.0	4.0	3.2	2.7	0.7	2.6	1.4	1.3	29.9
2003	0.2	0.3	2.4	2.5	4.1	2.4	3.6	3.0	1.6	1.5	6.6	1.3	29.4
2004	1.6	1.1	1.3	2.2	7.3	3.1	1.9	2.6	0.1	2.3	3.1	2.1	28.7
2005	4.2	2.1	0.7	1.4	2.2	4.8	3.3	1.7	3.4	1.0	4.3	2.1	31.3
2006	3.0	2.5	3.1	3.1	5.5	4.3	2.6	2.0	2.9	4.5	3.0	3.7	40.1
2007	1.3	0.8	3.1	4.2	3.3	1.7	3.6	4.6	1.6	2.5	0.9	2.7	30.3
2008	2.5	3.8	1.9	2.6	1.7	5.4	2.6	1.7	5.5	1.6	1.4	4.5	35.3
2009	0.9	3.5	3.3	6.4	2.1	5.0	1.7	3.6	1.0	5.4	0.9	1.7	35.6
2010	0.7	0.8	1.0	3.3	4.3	6.1	2.2	1.5	2.0	2.0	1.7	1.2	26.7
AVE	1.7	1.6	2.1	3.1	3.4	3.3	2.5	3.2	3.7	2.7	2.8	1.9	31.9

A description of the climate of central Michigan is likely to include a statement like:

“According to this map, this part of Michigan gets 30-32 inches of precipitation in a year.”

Name ____

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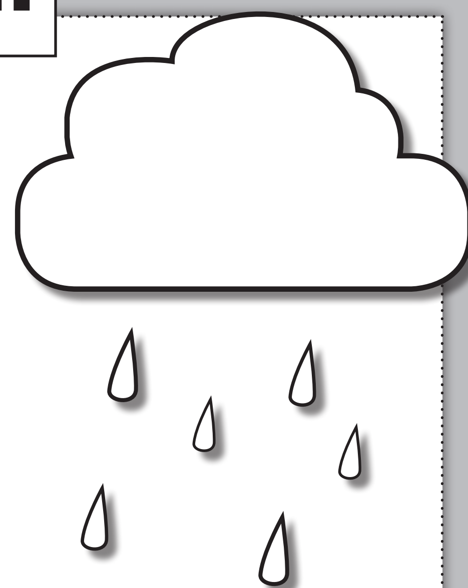

Use the data table *Midland Precipitation* and the following information to answer the questions.

To highlight the difference between climate and weather, we will explore a table of precipitation measurements from Midland, a small city near the middle of the Lower Peninsula. Start by looking at the average annual total – the number in the lower right corner of the data table. That number – 31.9 inches – is about what we should expect after being told about the map.

1. What year had the wettest weather (the highest total precipitation)? _____

2. What year had the driest weather (the lowest total precipitation)? _____

Annual totals and averages can hide some important differences from year to year. August, for example, is a critical month for corn growers. The long-term average of 3.2 inches is plenty of moisture to fill corn ears with kernels. Less than 2 inches, however, can pose a problem.

3. What year had the highest amount of rain in August? _____
   How many inches fell? _____

4. How many years out of 30 had less than 2 inches of rain in August? _____

On the other hand, too much rain in September can interfere with crop harvest. Unfortunately, a hurricane from the Gulf of Mexico can sometimes reach Michigan and bring a lot of rain.

5. What year had the least rain in September? _____
   How many inches fell? _____

6. What year had the most rain in September? _____
   How many inches fell? _____

7. How many years had more than 5 inches of rain in September? _____

TEACHER RESOURCE Answer Key

Midland Precipitation

The primary purpose of this activity is to highlight the difference between <u>weather</u> and <u>climate</u>. The secondary purpose is to give students practice in several ways of extracting information from a data table. These involve looking for averages, extremes, and counts of years that exceed a particular threshold.

The questions in this activity encourage them to use three common strategies:

- Look at the averages first, before examining individual months or years.
- Look for the extremes within a particular row or column. Examples include looking for the month with the highest or lowest precipitation in a given year, or the year with the highest or lowest precipitation in a given month. Other questions might test the hypothesis that April is typically the rainiest month of the year, or the idea that January is often too cold to have much precipitation.
- Count the number of years that exceed a specific threshold. Look for the number of Januaries that had less than an inch of precipitation, or the number of Aprils that had more than four inches (and therefore may have been too wet for field preparation).

Answers:

1. 2006 had 40.1 inches of precipitation.
2. 1989 had only 24.5 inches of precipitation.

The difference between those numbers highlights the difference between weather and climate. The range of weather conditions from year to year at one place can be much greater than the range of climate averages from the driest to the wettest part of the entire state of Michigan.

3. August of 1988 had 6.2 inches.
4. In 7 years out of 30 (almost one fourth), less than two inches of rain fell in August.

The amount of crop damage depends on rainfall timing as well as amount. For example, if the rain comes in just one storm, and the rest of the month is dry, crop damage is almost certain. If 2 inches come in two or three well-spaced storms, the crop might do well. At the other extreme, rain that comes as many small sprinkles might actually evaporate before the plants could get it. In short, “weather” is more than just the total amount of precipitation in a month.

5. In 2004, September had only one tenth of an inch of precipitation.
6. In 1986, a large hurricane system helped drop more than 18 inches of rain in September.
7. Five years had more than 5 inches of rain in September.

Knowledge of the frequency of extreme weather events is important for a variety of jobs, including bridge designer, traffic controller, building contractor, and park planner. A good climate description usually includes a statement of the likelihood of specific kinds of extreme events – hard rains, deep snows, early frosts, and so forth. These event probabilities are often expressed as the percentage of years that are likely to have the event. For example, someone noting that 6 out of 30 years had less than an inch of rain in May might say: “In about 20 percent of the years, Midland may not get enough rain for crop germination.”