

# Math TODAY™

## Teacher Edition

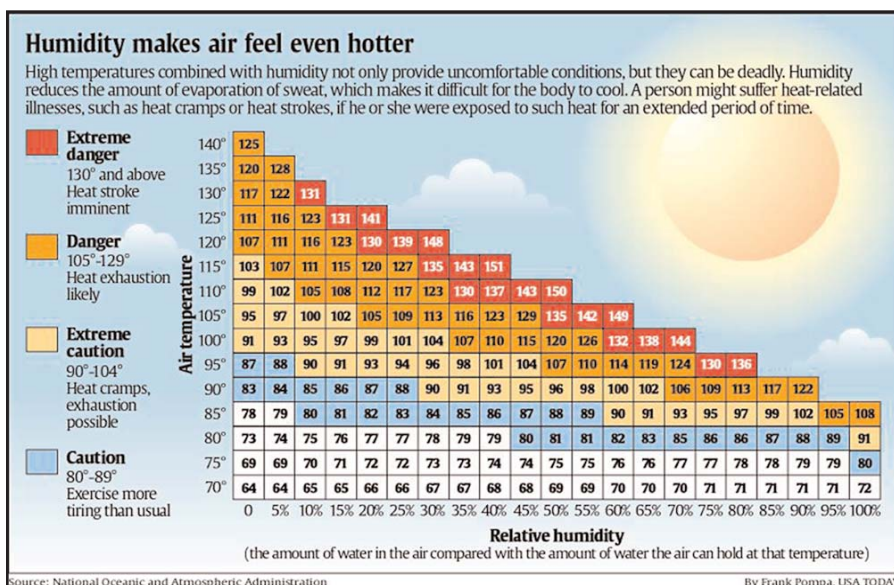
# USA TODAY

NO. 1 IN THE USA



## Humidity makes air feel even hotter

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### Activity Overview:

In this activity students will analyze the data in the USA TODAY Infograph "Humidity makes air feel even hotter." They will note the range of heat indexes on the overall data as well as specific humidity levels and air temperatures. They will find the mean and median of the ranges. Given the formula for calculating the heat index, students will calculate apparent temperatures for specific scenarios using the store feature of their handheld with a specified air temperature and humidity level.

### Concepts:

- Measuring central tendencies, mean and median
- Reading a dual axis chart
- Calculating range
- Using a formula

### Objectives:

Students will:

- read a chart with dual axes.
- calculate the range of data from both a horizontal and vertical perspective.
- calculate the mean and median of the ranges on the vertical axis.
- calculate heat indexes using a formula and handheld devices.

### Activity at a Glance:

- Grade level: 6-10
- Subject: Algebra
- Estimated time required: 50 minutes

### Materials:

- TI-73 family, TI-83 Plus family or TI-84 Plus family
- Overhead view screen calculator for instruction/demonstration
- Student handout
- Transparency

### Prerequisites:

Students should be able to:

- use the store feature on their handheld.
- calculate mean, median and range.
- use the exponent key on the handheld.



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## Humidity makes air feel even hotter

### Background:

Weather affects everyone. It affects what we wear, where we go and how hard we work or play. The introduction of this activity explains that the more humidity in the air, the slower our own perspiration evaporates. It is the evaporation process that helps us stay cool. This is the portion of the infographic most students will relate to. However, buried within the graphic is a wealth of mathematics.

Students often see little use in math concepts such as order of operations, negative exponents and evaluating formulas. The heat index is something students have heard about from their local weather person. It is a relevant, real life formula. By working with the formula, students will understand where the numbers come from and their relationship to temperature and relative humidity.

### Preparation:

- Provide one graphing handheld for each student.
- Each student should have a copy of the corresponding student activity sheet.

### Classroom Management Tips:

- Students will have a better understanding of how to read the graphic and retrieve data if you use the transparency for a class discussion before the students start working.
- Students can work individually or in small groups on this activity. Working in groups is especially helpful as they learn the various features of the handheld.
- Allow students to talk about the "how" and "why" approach they used to find the solutions.
- The formula for calculating the heat index contains numbers in scientific notation, positive exponents, negative exponents, and implied multiplication. Although the students are not required to do calculations with these, you may want to use this activity after they have seen the concepts.
- This activity can be used as a review of concepts or a culminating activity with the class.

### Data Source:

National Oceanic and Atmospheric Administration

### National Council of Teachers of Mathematics (NCTM) Standards\*:

#### Algebra Standard

- Represent and analyze mathematical situations and structures using algebraic symbols.
- Use mathematical models to represent and understand quantitative relationships.

#### Number and Operations Standard

- Compute fluently and make reasonable estimates.

#### Data Analysis and Probability Standard

- Develop and evaluate inferences and predictions that are based on data.

#### Problem Solving Standard

- Solve problems that arise in mathematics and in other context.

#### Communications Standard

- Organize and consolidate their mathematical thinking through communications.
- Communicate their mathematical thinking coherently and clearly to peers, teacher and others.

#### Representation Standard

- Select, apply, and translate among mathematical representations to solve problems.
- Use representations to model and interpret physical, social, and mathematical phenomena.

\*Standards are listed with the permission of the National Council of Teachers of Mathematics (NCTM), [www.nctm.org](http://www.nctm.org). NCTM does not endorse the content or validity of these alignments.

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### Activity Extension:

- Using today's USA TODAY Weather page on the back of the News section, have students identify the cities around the U.S. with temperatures above 80 degrees. Do the same for the international cities listed. Then, have them create a graphic organizer that shows which cities fall into each of the heat categories shown: caution, extreme caution, danger, extreme danger. Which world city is expecting the hottest weather today?
- Using a CBL, with temperature probes and a humidity probe gather data for your area and calculate the heat index.
- Have students create posters summarizing the four warning levels of the heat index for community awareness.
- Have students research geographical areas, which would reach the extremes of a heat index of 151.

### Curriculum Connections:

- Science/Biology
- Health/Physical Education
- Geography

### Additional Resources:

- Student handout
- Transparency
- TI Technology Guide, for information on the following: TI-83 Plus family, TI-84 Plus family, TI-73 family, List Editor, Science Tools, Finance and Cabri® Jr.
- TI-Navigator™ Basic Skills Guide for information on using the TI-Navigator Classroom Learning System

### Teacher Notes:

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### Activity 1

**Q. What are the maximum and minimum heat indexes in the USA TODAY Infograph? What is the range of the data in the Infograph?**

A. Max: 151°F                                      Min: 64°F                                      Range: 87°F

**Q. What is the mean of the ranges for the heat indexes? What is the median of the ranges? Explain what this tells us about the effects of humidity on the heat index.**

A. Mean: 30°F                                      Median: 30°F                                      The relative humidity can effect the feel of the temperature by 30 degrees on average.

**Q. Which temperature has the greatest range? Which relative humidity has the greatest range?**

A. Temperature: 105°F                                      Range: 54°F                                      Relative Humidity: 40%                                      Range: 83°F

**Q. Which temperature has the smallest range? Which relative humidity has the smallest range?**

A. Temperature: 70°F and 135°F                                      Range: 8°F                                      Relative Humidity: 95%                                      Range: 34°F

**Q. Give three different combinations that would produce a heat index of 91.**

	Temperature (°F)	Relative Humidity (%)
1)	85	65
2)	90	35
3)	95	15

**Q. If you were a meteorologist for a local TV station, what warning level would you post if the predicted high temperature for the day were 95° with a predicted relative humidity of 45%?**

A. Extreme caution

### Activity 2

**Q. Using the formula you stored in your handheld, find the heat index for an air temperature of 105° and a relative humidity of 50%. Round your answer to three decimal places. Remember, your answer may be slightly different from the chart.**

A. Heat Index: 134.911°F

**Q. Using the formula you stored in your handheld, find the heat index for an air temperature of 120° and a relative humidity of 85%. Round your answer to three decimal places. This answer is not in the chart.**

A. Heat Index: 315.035°F



If you are using the TI-Navigator Classroom Learning System, send the provided LearningCheck assessment to your class to gauge student understanding of the concepts presented in the activity. See the TI-Navigator Basic Skills Guide for additional information on how this classroom learning system may be integrated into the activity.