Math Forum Teacher Packet

TI-PoW: Chirp! Chirp!

Focus Activity: I Notice, I Wonder

http://mathforum.org/mathtools/activity/64538/

Welcome!

This packet contains a copy of the original problem used to create the activity, rationale and explanation behind the "I Notice, I Wonder" focal activity, and some thoughts on why this activity works well with TI-Nspire™ technology.

All of the problems and activities are samples of the Math Forum's Problems of the Week, paired with activities from the Problem Solving and Communication Activity Series. We are highlighting activities and problems that make good use of TI-Nspire™ handhelds.

Teachers and/or students are able to electronically access this and similar problems after setting up a login (free) available from the Math Forum @ Drexel. Sign up using the link on the Technology Problems of the Week (tPoW) login page, or use your existing KenKen® or Problems of the Week login–see this page for details: http://mathforum.org/tpow/about.html

The Problem

TI-PoW: Chirp! Chirp!

I read once that you can figure out what the temperature is in degrees F (Fahrenheit) by counting the number of chirps that a cricket makes in 15 seconds. I couldn't remember the formula, but I did find some data.

chirps in 15 seconds	temperature in F
25	65
32	72

Question: What could the temperature be when a cricket is chirping 164 times a minute?

Extra: Write a formula that could be used to predict the temperature given the number of chirps per 15 seconds. Note: Use "c" for chirps and "t" for temperature.

Standards

This problem presents an opportunity for students to think about patterns, units of measurement and also to work on expressing the pattern as a formula that will lead them to thinking algebraically.

If your state has adopted the Common Core State Standards, this alignment might be helpful:

Grade 6: Expressions & Equations

6.EE.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem.

Grade 7: Expressions & Equations

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Grade 8: Expressions & Equations

8.EE.7. Solve linear equations in one variable.

The Strategy

This activity focuses on two strategies: Change the Representation and Understand the Problem. The key to understanding this problem is understanding and seeing patterns in the data given. Too often students in math class rush to guess calculations rather than stopping to think, "do I understand what's going on here?" or "what patterns can I see?" or "what are the relationships in the problem."

The first thing we ask students to do in this activity is Notice and Wonder. Those two key words are important because they encourage students to connect to their own ideas and insights into the problem. Rather than trying to guess the right operation or what the teacher thinks is important, we ask students, "What do *you* notice? What are *you* wondering?" This encourages students to use their own ideas to make sense of the problem.

We ask students to notice and wonder about the story of the problem, and then about the data from the problem presented in both a table and a graph. By presenting multiple representations, and asking students to notice and wonder about all three, we begin to support students to think about connections among representations.

The final task we give students is to discuss what is the same and what is different about what they noticed from the table and the graph. Comparing representations is a key skill for learning new representations and making good choices about choosing how to represent data given in a problem.

The TI-Nspire

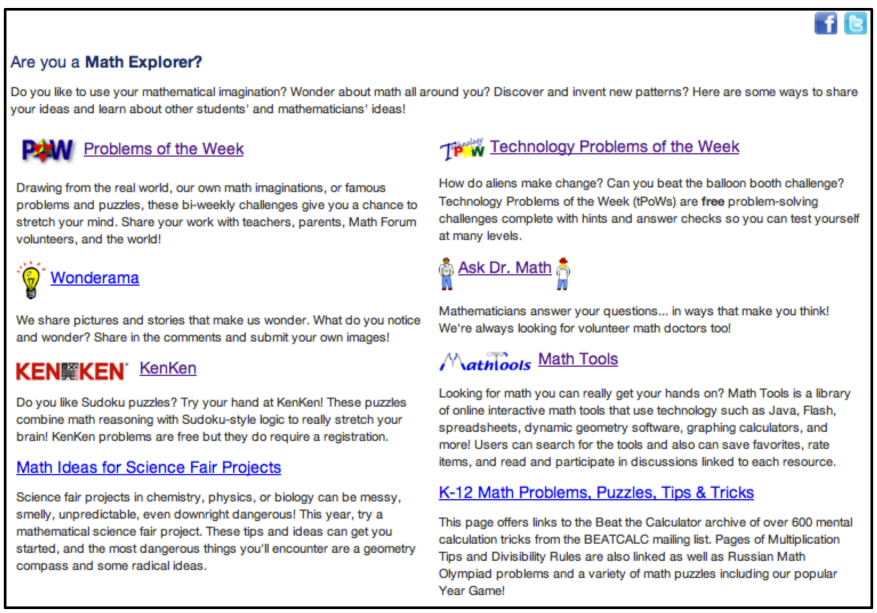
In this activity we use the TI- Nspire™ software's linked representations. While the students aren't asked to manipulate the data and compare the results of, say, adding more points, the activity is created so that this is possible. However, you might consider this activity to be a warm-up before doing further work with the linked representations. Do students understand that the graph and table show the same data? Can they find how the graph is labeled? How the data is labeled? Are they showing the same quantities?

Because this activity uses the TI-Nspire™ software in a more static way, you could use the same prompts in a small-group or whole-group discussion, rather than using the handhelds for students to record their individual thinking.

Join Us!

Do your students like to use their mathematical imaginations? Wonder about math all around them? Discover and invent new patterns? Here are some ways for them to share their ideas and learn about other students' and mathematicians' ideas!

http://mathforum.org/explorers/


Are you a **Math Explorer?**

Do you like to use your mathematical imagination? Wonder about math all around you? Discover and invent new patterns? Here are some ways to share your ideas and learn about other students' and mathematicians' ideas!

Problems of the Week

Drawing from the real world, our own math imaginations, or famous problems and puzzles, these bi-weekly challenges give you a chance to stretch your mind. Share your work with teachers, parents, Math Forum volunteers, and the world!

Technology Problems of the Week

How do aliens make change? Can you beat the balloon booth challenge? Technology Problems of the Week (tPoWs) are **free** problem-solving challenges complete with hints and answer checks so you can test yourself at many levels.

Wonderama

We share pictures and stories that make us wonder. What do you notice and wonder? Share in the comments and submit your own images!

Ask Dr. Math

Mathematicians answer your questions... in ways that make you think! We're always looking for volunteer math doctors too!

KenKen

Do you like Sudoku puzzles? Try your hand at KenKen! These puzzles combine math reasoning with Sudoku-style logic to really stretch your brain! KenKen problems are free but they do require a registration.

Math Tools

Looking for math you can really get your hands on? Math Tools is a library of online interactive math tools that use technology such as Java, Flash, spreadsheets, dynamic geometry software, graphing calculators, and more! Users can search for the tools and also can save favorites, rate items, and read and participate in discussions linked to each resource.

Math Ideas for Science Fair Projects

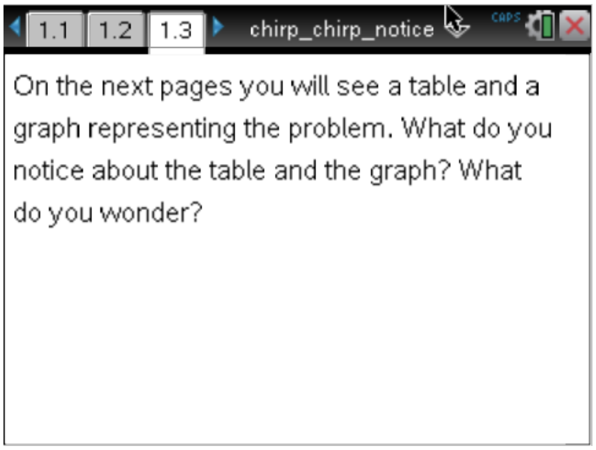
Science fair projects in chemistry, physics, or biology can be messy, smelly, unpredictable, even downright dangerous! This year, try a mathematical science fair project. These tips and ideas can get you started, and the most dangerous things you'll encounter are a geometry compass and some radical ideas.

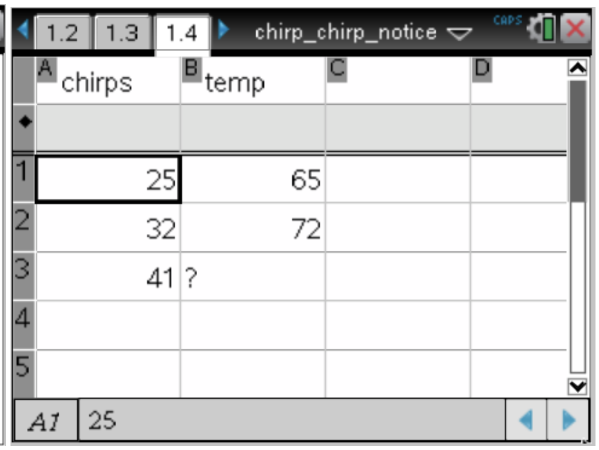
K-12 Math Problems, Puzzles, Tips & Tricks

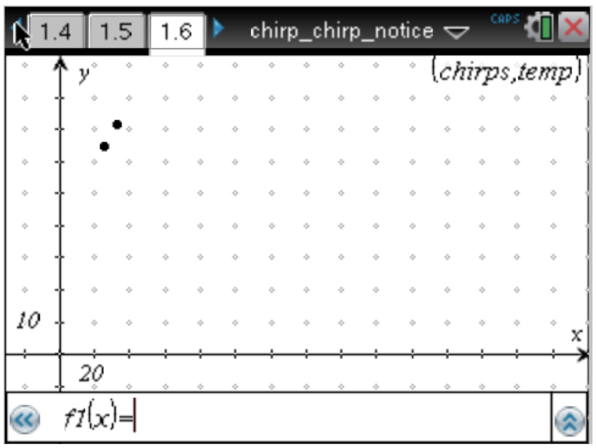
This page offers links to the Beat the Calculator archive of over 600 mental calculation tricks from the BEATCALC mailing list. Pages of Multiplication Tips and Divisibility Rules are also linked as well as Russian Math Olympiad problems and a variety of math puzzles including our popular Year Game!

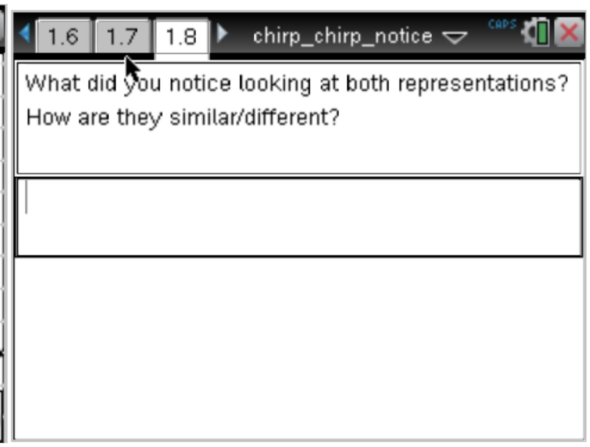
The Activity

Key Screen Shots









Possible Responses

Noticings & Wonderings about the problem	Noticings & Wonderings about the table	Noticings & Wonderings about the graph	Similarities & Differences
It's about crickets and temperature The crickets chirp more when it's hotter They are counting chirps per 15 seconds The problem mentions chirps in one minute I wonder how the crickets know the temperature I wonder if the crickets can count I wonder if this works when it's really hot or really cold	I notice that as you go down the table, the numbers in both columns go up I notice a question mark I notice the question mark goes with 41, I wonder if that has to do with the 164 chirps per minute in the problem I notice the numbers in the temp column are always 40 more than the numbers in the chirp column I notice chirps and temp both go up by 7 from row 1 to row 2.	I notice there are two points I notice the points are on a line that goes up pretty steeply I notice it says (chirps, temp) in the corner I notice the scale is by 20s on the x-axis and by 10s on the y-axis I wonder what the labels for the axes would be in terms of the problem I wonder where the (41, ?) point would go	The graph makes me think of a line but the table doesn't You could use the graph to predict where the (41, ?) point would go without doing any calculations Both of them show that 25 goes with 65 and 32 goes with 72 Both show that the temperatures and chirps per 15 seconds are going up The table shows that the temp is always 40 more than the chirps