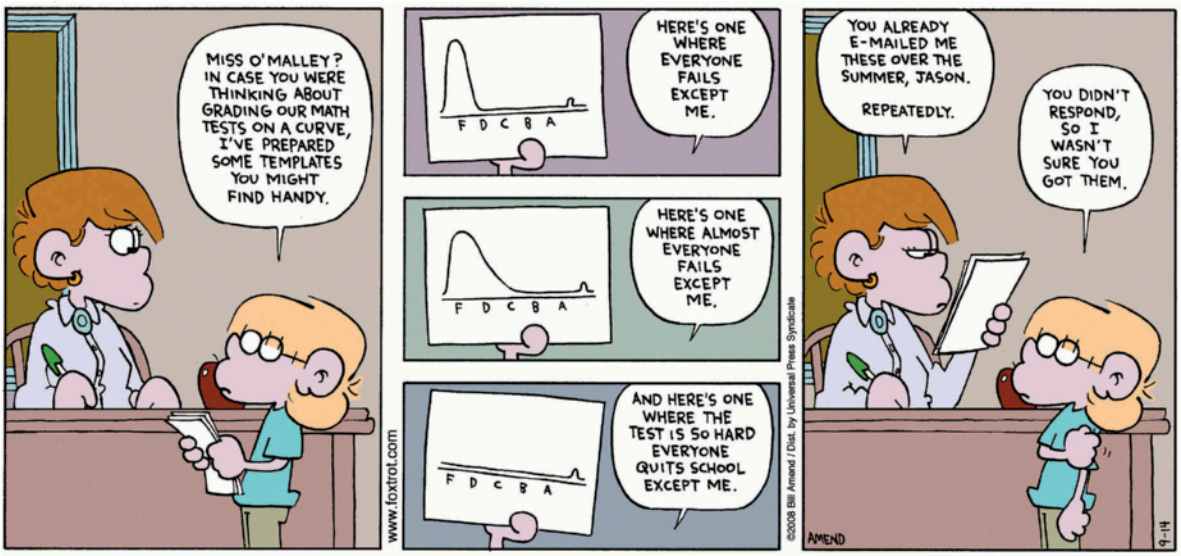
cartoon corner

Name _____

FOXTROT by Bill Amend



SCATTERED GRADES

1. Are Jason's graphs reasonable? Are they likely to represent a real classroom? Explain your reasoning.

2. Which graph in the comic represents the best grades? Why?

3. What other types of graphs could be used to represent Jason's data? How would these representations be different? That is, what could you tell about the students' grades in each different type of graph?

4. Use the data in **table 1** to create three scatter plots:

   a. Average hours watching TV per night versus shoe size
   b. Test score versus shoe size
   c. Test score versus average hours watching TV per night

5. Based on your graphs from problem 4, predict each missing value in the table below. If you are able to predict a value, explain your reasoning. If not, explain why.

Avg. hrs. watching TV per night			4.5
Test score	84		
Shoe size		8.5	

CHALLENGE

6. Find a way to predict test scores based on larger number of hours spent watching TV. Specifically—

   a. find a way to predict a test score for someone who watches 6 hours and 8 hours of TV per night.
   b. find a way to predict the number of hours of TV watching for someone who got a grade of 65 and a grade of 35.

   Explain how you obtained your answers.

Table 1

Average hours watching TV per night	2	5	3	4	2.5	1	1.5	3	3.5	0.5	0	2.5	3	3.5	1	1.5
Test score	92	67	90	72	89	95	92	85	82	98	99	87	85	80	95	93
Shoe size	5.5	7	10.5	6	11	8	7.5	7	9	9.5	11	12	10.5	9	8	6.5

from the November 2010 issue of mathematics teaching in the MIDDLE SCHOOL

Edited by **Stephen P. Smith** and **Peggy House,** Northern Michigan University, Marquette. Classroom teachers interested in field-testing or submitting a cartoon should contact **Stephen P. Smith**, stepsmit@nmu.edu. The cartoons must include the date and the newspaper syndicate that holds the copyright.

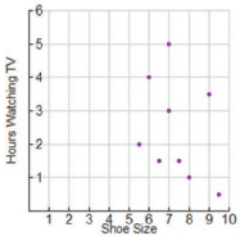
SOLUTIONS

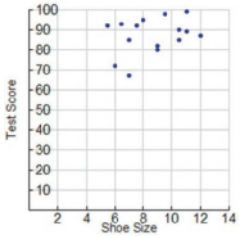
1. We hope that students will not view the graphs as reasonable. One would not expect all but one grade to be failing.

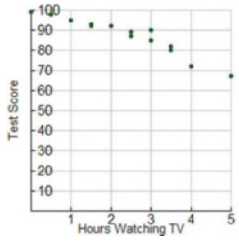
2. The graph that has the best results for students is the middle one. However, students would still have done poorly as a class.

3. Bar graphs, histograms, line plots, or stem-and-leaf plots could also be used. Bar graphs and line plots indicate how many students achieved each grade. Histograms would show how many students scored within a certain grade range. Stem-and-leaf plots would be a good exercise in statistical analysis.

4.







5. The only relation that has a correlation—negative—is hours watching TV and test scores; otherwise, there is no correlation between the variables. Using graphing software and linear regression, a test score of 84 correlates to about 2.9 hours of TV per night, although an answer between 2.75 and 3 hours would be reasonable. For the student who watches 4.5 hours of TV, a test score of 73–75 is reasonable. (The linear regression equation $y = -6.2x + 102$ produces an answer of 74.17 points.) Since the other relations have no correlation, it is not possible to estimate the other missing values in the table.

6. For the challenge questions, students need to create a trend line, or line of best fit. Using the line of best fit calculated for question 5, a person watching 6 hours of TV per night should score about 65; someone watching 8 hours of TV should score about 52. A person who scored 65 on the test would be predicted to watch about 6 hours of TV. According to the line of best fit, a person who scored 35 would be watching almost 11 hours of TV per night. This number is virtually impossible, and students should conclude that the trend only holds within a reasonable range.

FIELD-TEST COMMENTS

This activity was very effective with my eighth-grade students, who have a range of abilities. These students were already able to create and read scatter plots, but this lesson was presented near the beginning of our unit on statistics. The questions in this lesson focused on what information we can read from a graph and what information we cannot get from a particular graph.

I introduced this activity by sharing some graphs similar to the ones in the cartoon and helped students discuss what they could learn from the graph. Students then worked in pairs to answer the questions and create the graphs in the activity. I provided each team with sheets of graph paper to help them create scatter plots.

The activity was very accessible for all levels of students while still encouraging higher-level thinking. The lesson did take more time than I anticipated. I would suggest devoting two forty-five-minute class periods to this activity, including time to introduce the lesson.

I asked students to describe what they thought their own class-performance graph of a recent test would look like. I also asked which graph a teacher might choose to represent the class. Would a teacher choose the same graph you did? Why, or why not?

Dave Johnston
Luna Middle School
San Antonio, Texas

Looking for something fun and worthwhile to do the day before spring break? I adapted this activity for all five of my classes with students in grades 6 through 8. Although many of the students had a fondness for "FoxTrot," understood Jason's perspective, and had heard the expression *grading on the curve,* most needed an explanation for what it really meant.

There is more to statistics than the measures of central tendency. A couple of the classes spent the majority of the time on that topic and reserved the graphing for another day. Some students were unaccustomed to seeing a graph of this nature, thinking that all "line" graphs show change over time. Before completing the graphing, students were encouraged to predict how the plots would look and which sets of data would show a correlation.

Some students needed clarification on the meaning of "average numbers of hours watching TV." They wanted to jump to the conclusion that five hours of viewing was for only the night before the test. The sixth and seventh graders used this as an opportunity to practice entering data on the graphing calculator and then creating the scatter plot.

Graphing has become an integral part of higher mathematics. Middle school students need and welcome activities such as this to explore new ways to model different situations.

I recommend an article in the September 2004 *Mathematics Teacher*, "Examining Students' Reluctance to Use Graphs," to any middle school teacher who would like to see where his or her students are heading.

Pamela Haner
St. Catherine's School
Richmond, Virginia

My fifth-grade students needed a graphing challenge because we were reviewing for statewide testing. They completed this assignment in March as part of the review. They had already covered graphing but not to this extent. It provided me an opportune time to gently "remind" them about the different types of graphs that we had studied in October—bar, line, circle, stem-and-leaf, and box-and-whisker graphs, as well as histograms, frequency tables, line plots, pictographs, and scatter plots. They were then asked to give descriptions of each type of graph, list advantages and disadvantages of each one, and offer examples of when we might use each.

They had studied scatter plots but had not made one, so this assignment worked fabulously for exposing them to the idea of creating one of their own while entertaining them about test scores of a fictional class. (We had just returned graded papers so they also discussed what a scatter plot of those assignments would have looked like.)

They were laughing out loud when they realized that the third graph showed everyone dropping out of school except the one student in the cartoon. And they were very thankful that he is not in our class! This worked perfectly as an extension-review tool for our upcoming testing.

Before tackling this in class, I wish I would have made three-dimensional interactive graphic organizers about the types of graphs, advantages and disadvantages of each one, and so on, for my students to have as a reference. I did not think of that before starting this activity—the next time I use it in class, I will have the students make those organizers, first to alleviate some of their I-know-we've studied-this-earlier-but-I forgot questions.

I would also like to have my students do their own number crunching and make graphs using our own class information about some assignments. I think it would interest them to see their own class picture. They related well to the cartoon and had fun with their own math class information while thinking, "What if?"

Tina Gay
K. E. Taylor Elementary School
Lawrenceville, Georgia

OTHER IDEAS

- Depending on your students' experience with scatter plots, you can develop the ideas associated with the line of best fit. This could also take the class into exploring slope, y-intercept ($y = mx + b$), and so on.
- Students can generate stories to go along with graphs that the teacher provides.
- See also chapter 4 of the NCTM publication, *Navigating through Data Analysis in Grades 6–8* for more data and ideas.

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