Tell Stories, Teach Math

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What is a story?

Any sequence of events with a **beginning**, **middle**, and an **end** makes up a story, but it would not be a very interesting story unless it had a dramatic twist of some sort so the end could not be anticipated.

My Lesson Mantra

- Set the Stage
- Do the Activity
- Debrief

The Stories

Road Sign Problem

Fraction Darts & Number Town

The Famous Jinx Puzzle

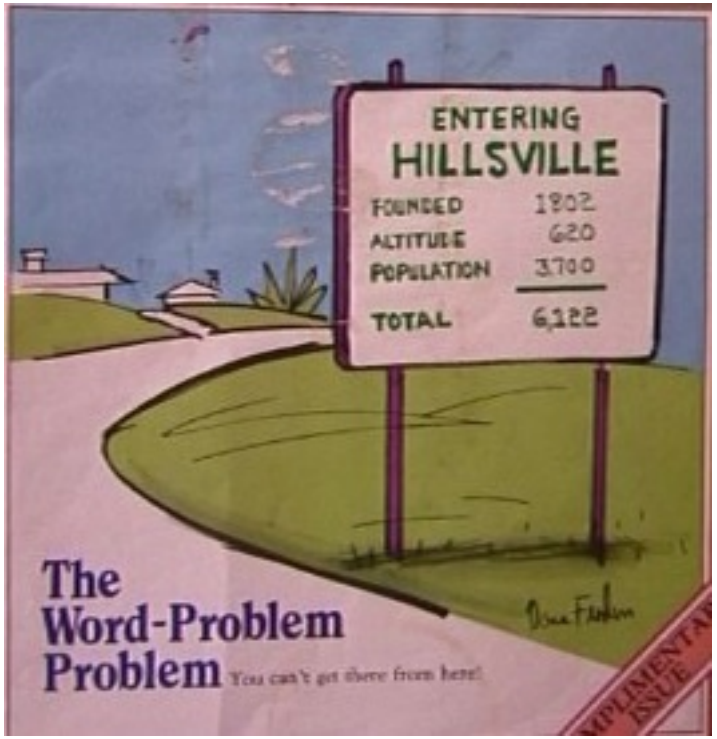
How Round is the Earth?

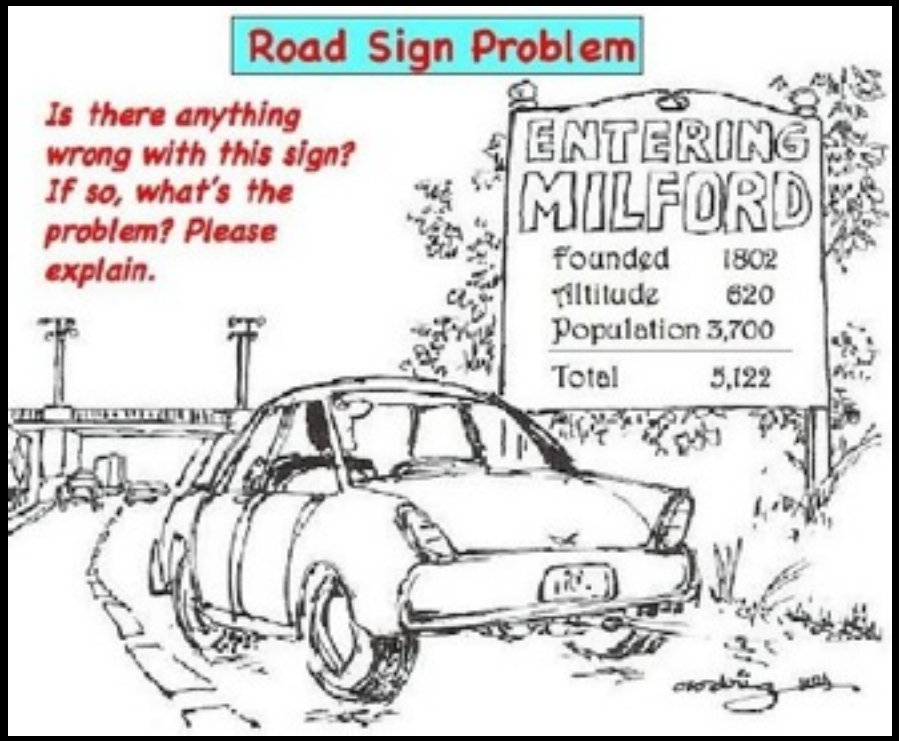
Great Green Globs Contest

let's begin...

Story #1

The Road sign Problem



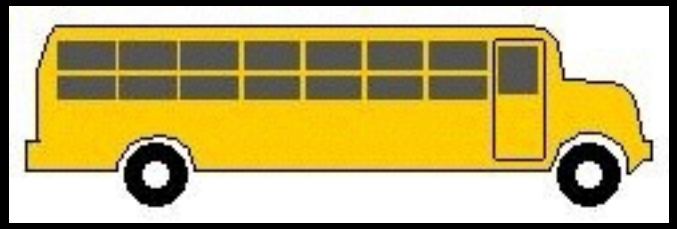


Most common responses:

The total should be 6,122

There's should be a comma between the 1 and 8 in 1802

The answer should have some kind of units.



You are about to go on a field trip with the entire school. There are 438 teachers, students, and administrators in your building. Everyone will be traveling by school bus. If each bus (excluding the bus driver) can seat a maximum of 30 people, how many buses will you need to transport everyone?

One of the problems on the NAEP secondary mathematics exam, which was administered to a stratified sample of 45,000 students nationwide, was the following:

An army bus holds 36 soldiers. If 1128 soldiers are being bused to their training site, how many buses are needed?

•Seventy percent of the students who took the exam set up the correct long division and performed it correctly. However, the following are the answers those students gave to the question of "how many buses are needed?":
•29% said..."31 remainder 12"
•18% said..."31"
•23% said..."32", which is correct.
•30% did not do the computation correctly.

•It's frightening enough that fewer than one-fourth of the students got the right answer. More frightening is that almost one out of three students said that the number of buses needed is "31 remainder 12". [our emphasis]

School Trip (Bus) Problem solution

Teacher's page

A good solution for students still struggling with problem solving with division is to answer this question in a sensible and more understandable way like the one below.

	TARGET: 438	TOTAL (so far)
bus 1	30 passengers	30 passengers
bus 2	30 passengers	60 passengers
bus 3	30 passengers	90 passengers
bus 4	30 passengers	120 passengers
○ ○ ○		○ ○ ○
bus 13	30 passengers	390 passengers
bus 14	30 passengers	420 passengers
bus 15	30 passengers	450 passengers

The student would see more clearly why 15 busses (not 14.6) are needed. Of course, this process is not as efficient as knowing what to do with the quotient after dividing, but it's a meaningful step in the right direction.

Comment #6691: AJMccarron - grade 4 student - commented on Mar 30, 201

6122

Comment #6687: 10county10 - grade 8 teacher - commented on Mar 28, 2014. LIKE

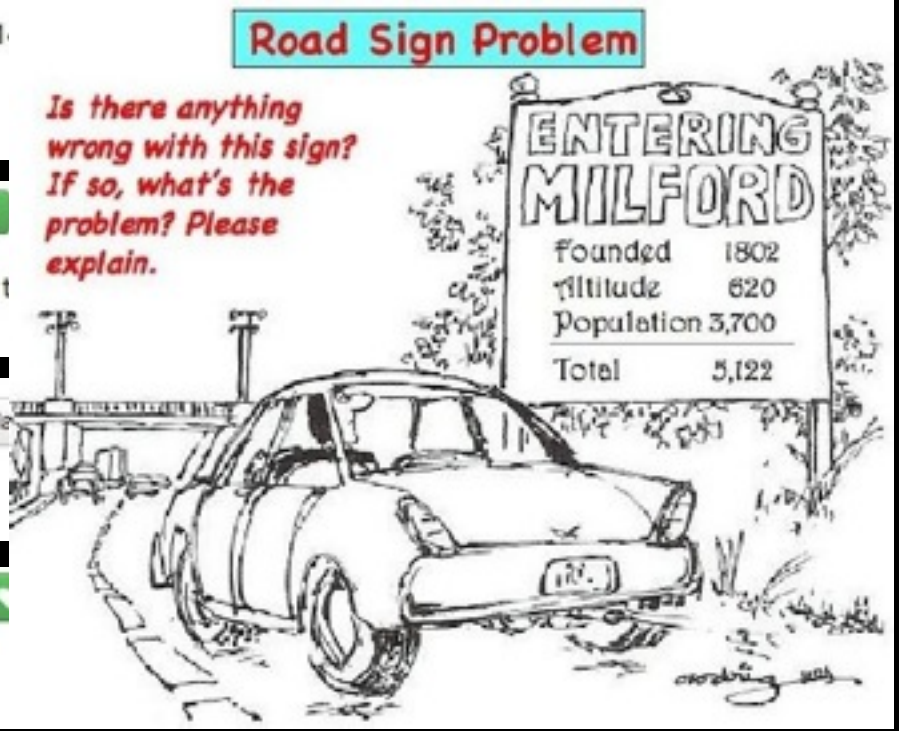
I believe it should be 6,122. Since it looks like they added the 3 amounts t values correctly.

Comment #6678: MrsMalik - grade 5 student - commented on Mar 27, 2014. Ala

The total should be 6,122 people.

Comment #6667: MrHunziker - grade 4 teacher - commented on Mar 27, 2014.

1802+620+3700=6122



Comment #6623: as4g13 - grade 4 student - commented on Mar 26, 2014. Alarm LIKE ♥0

The total is wrong because 1802+3,700=5,502+620=6,122.Who ever put up the sign forgot that if it is 10 or higher you take the 10's place and take it to the next digit

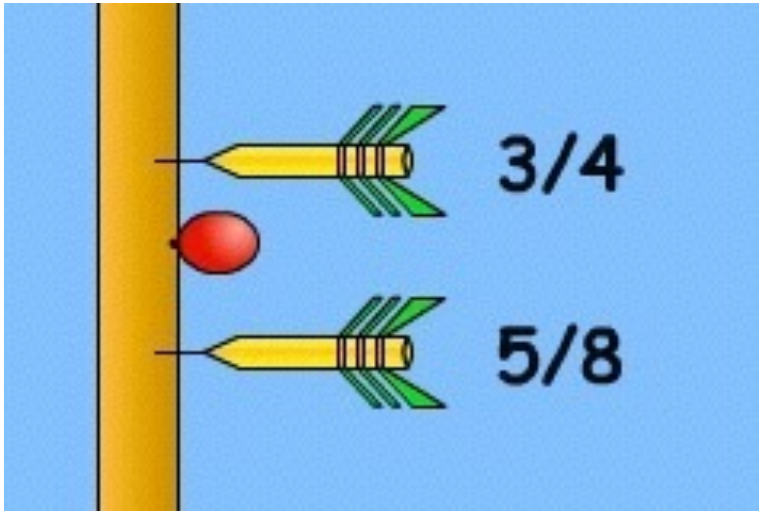
Comment #6674: Silanustheroman - grade 6 student - commented on Mar 27, 2014. Alarm Unlike ♥4

The total what? Cats?

Comment #6610: MyHumps - grade 8 student - commented on Mar 26, 2014. Alarm Unlike ♥2

The sign seems to be stating a vague mathematical description of something. It totals population, altitude, and when it was founded to create a number that does not explain anything.

Story #2
Fraction Darts



Go to Game

The trouble with Fractions

A fraction is a single number with a specific value rather than two independent whole numbers. It can be represented as:

-> part of a single whole or a set
-> a quotient of integers
-> a measure i.e. a number on a number line
-> a ratio of two integers
-> as a decimal
-> as a percentage

Story #2 continued

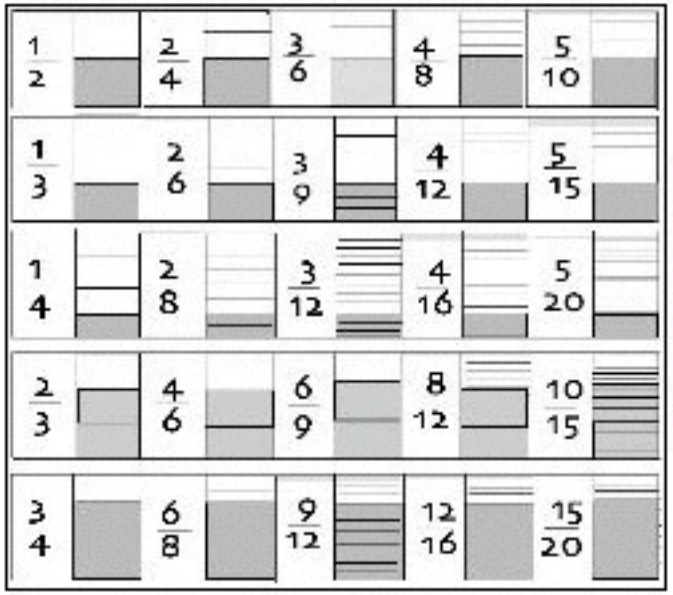
Number Town

http://ciese.org/ciesemath/number_town.html

Activity: Family Fractions

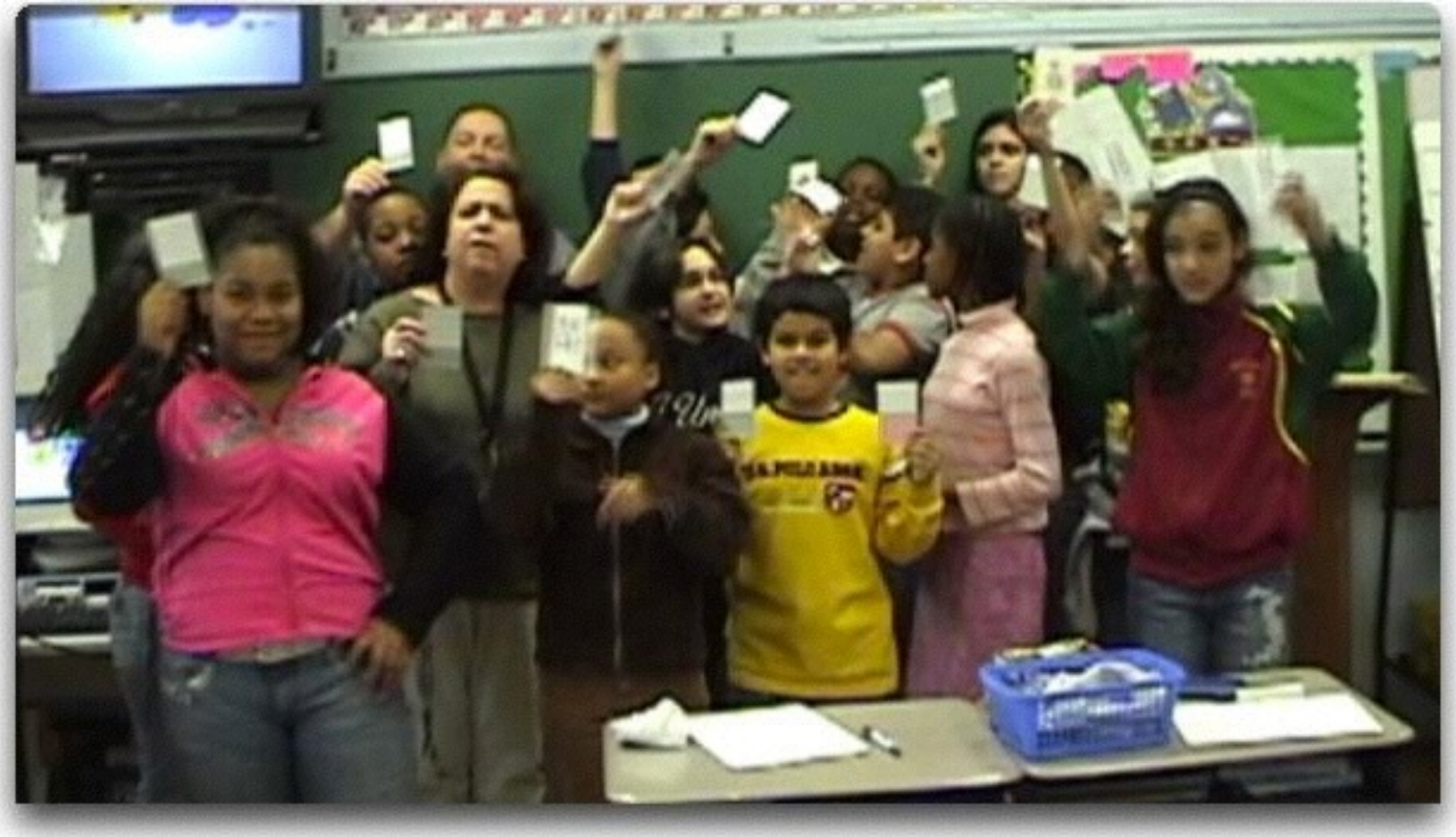
A scene from this summer's blockbuster movie *The Weird Number.* The star of the movie is 2/3. Can you find 2/3 in the photo on the left? (He's wearing a "disguise".)

Make a set of 25 Fractionville ID cards with the fractions indicated below or print out the files that are linked below and cut out the individual cards.



Cards based on 1/2 - (1/2, 2/4, 3/6, 4/8, 5/10)
Cards based on 1/3 - (1/3, 2/6, 3/9, 4/12, 5/15)
Cards based on 2/3 - (2/3, 4/6, 6/9, 8/12, 10/15)
Cards based on 1/4 - (1/4, 2/8, 3/12, 4/16, 5/20)
Cards based on 3/4 - (3/4, 6/8, 9/12, 12/16, 15/20)
Other Numbers

Mr. Siracusa's Class - We Are Family!



"...Of course, many children memorize how to perform the mumbo-jumbo and manage to get an A but because they don't understand what they are doing once the test is over they revert back to not knowing how to add fractions. If the meaning was there they would remember.

Just how successful a person is in mastering school mathematics is largely a matter of how much meaning they can construct for the symbols manipulated and the operations performed on them.

The problem many people have with school arithmetic is that they never get to the meaning stage; it remains forever an abstract game of formal symbols..."

The Math Instinct - Why you are a Mathematical Genius
by Keith Devlin - page. 248

Story #3

The Famous Jinx Puzzle

Pick a Number (1 to 10)
Add 11
Multiply by 6
Subtract 3
Divide by 3
Add 5
Divide by 2
Subtract the original number

13

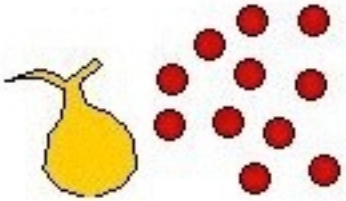
Powerful Idea

http://dmcpress.org/cmdb75/jinxpuzzle/

Step 1: Pick a number.

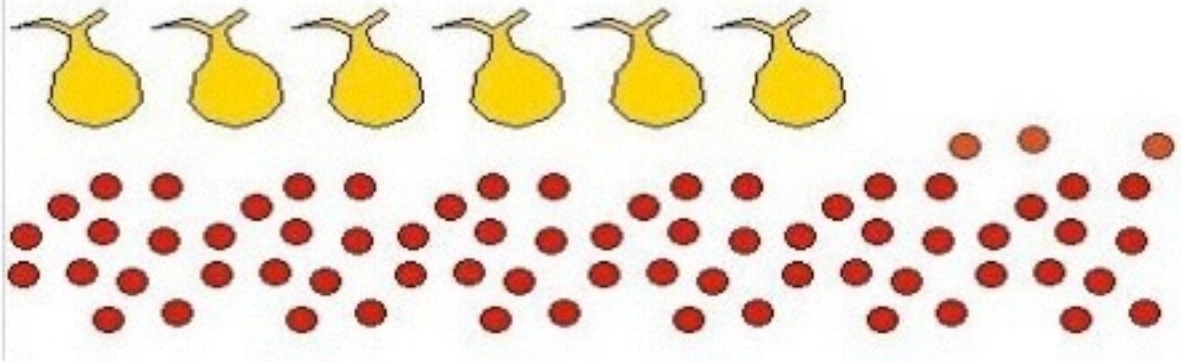
Instead of picking a specific number, let's choose to use something that could represent any number. Let's use a bag.

Step 2: Add 11



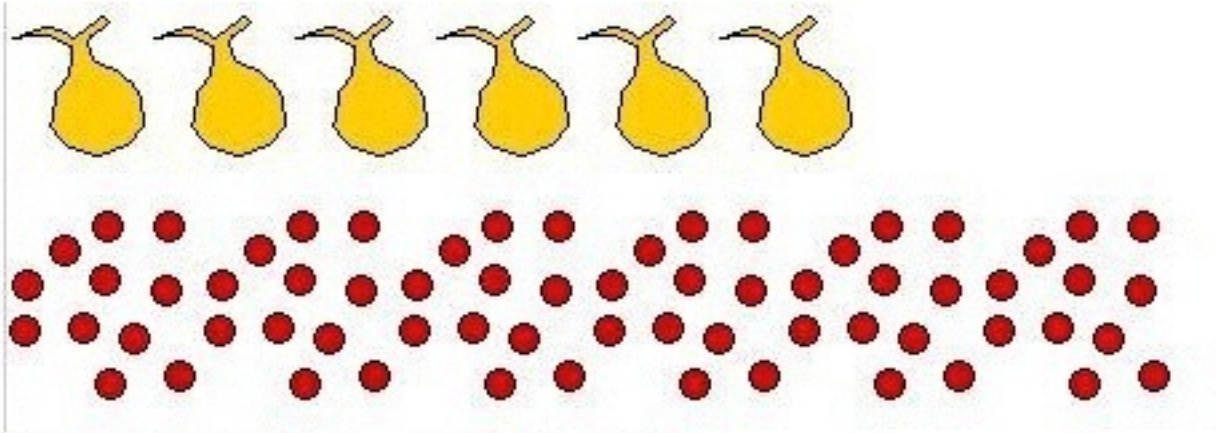
To show 11 we will use 11 small circles or "marbles". Now we have a bag and 11 "marbles."

Step 3: Multiply by 6



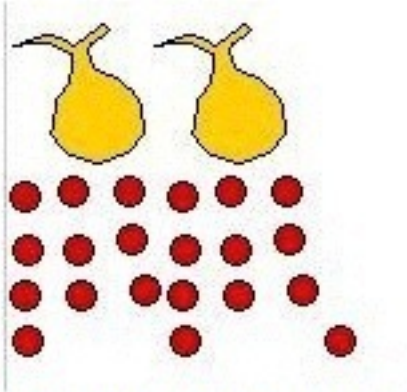
We have 6 bags and 66 marbles.

Step 4: Subtract 3



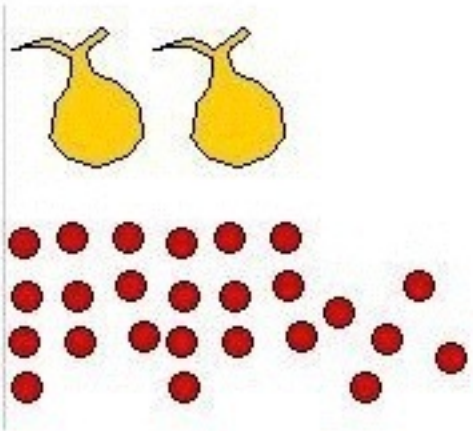
Now we have 6 bags and 63 marbles.

Step 5. Divide by 3



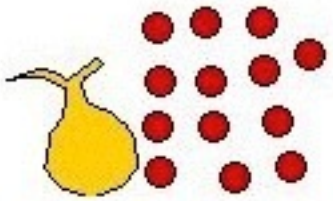
What's left? 2 bags and 21 marbles.

Step 6. Add 5



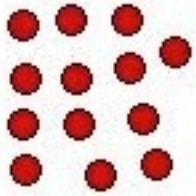
There are 2 bags and 26 marbles.

Step 7. Divide by 2



and we have 1 bag and 13 marbles.

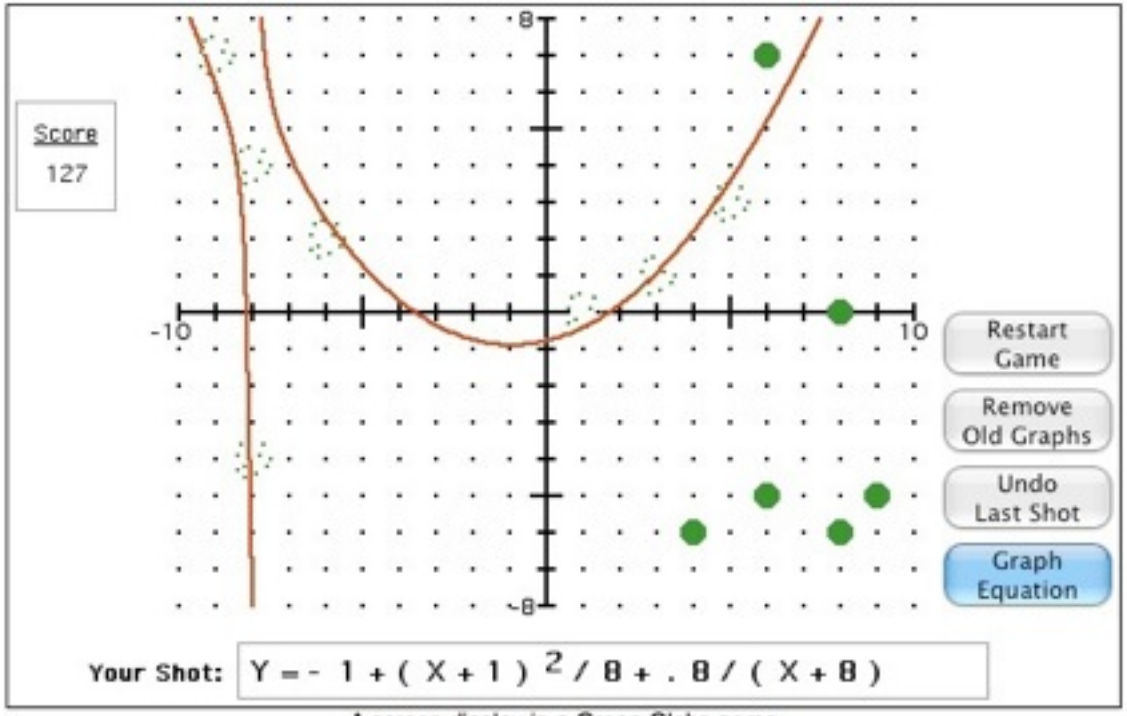
Step 8: Subtract the number you picked in step 1.



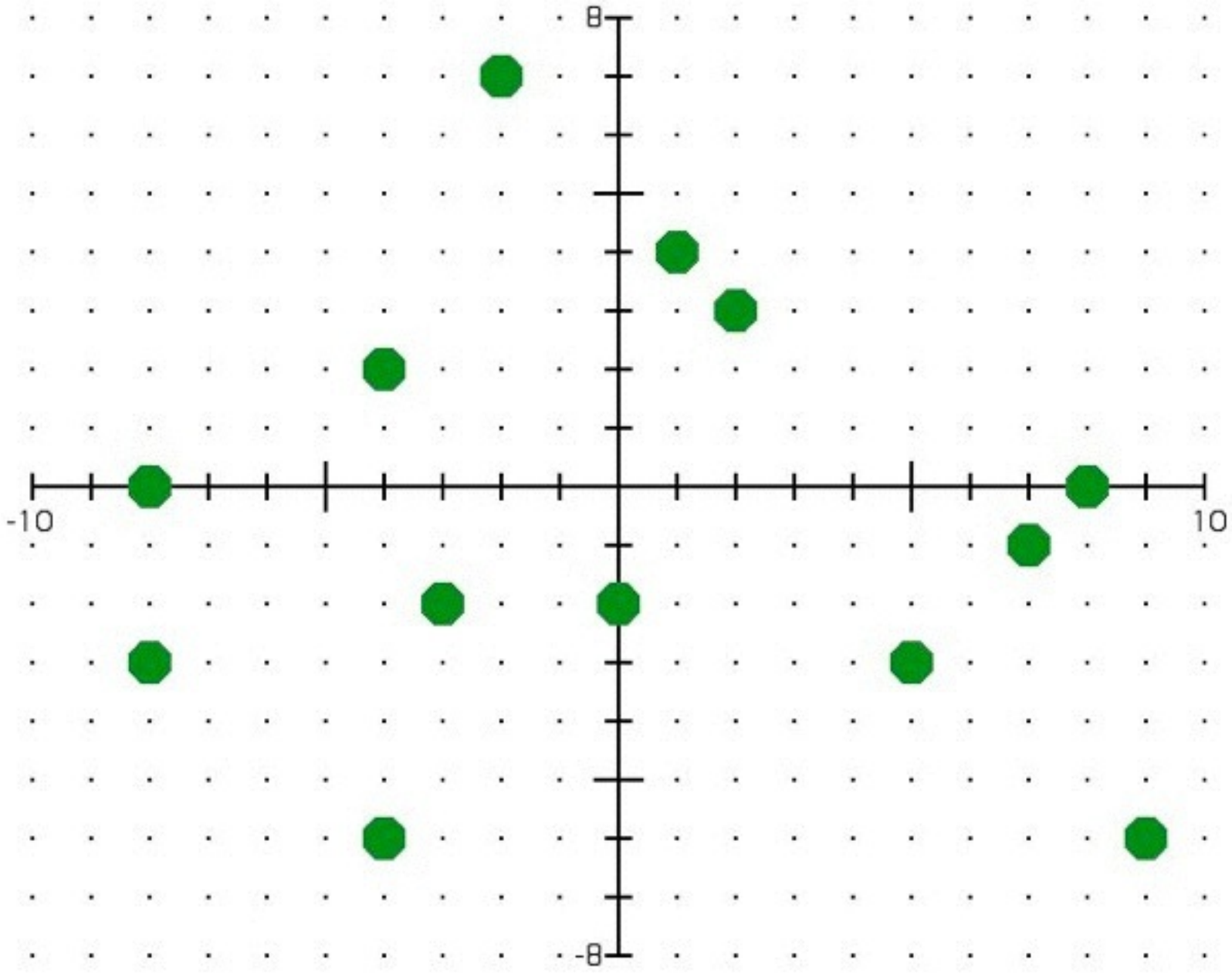
But that's the bag. You subtract the bag! So you are left with only 13 marbles or just plain 13.

Story #4

The Great Green Globs Contest



A screen display in a Green Globs game



Your Shot:

On my way to Green Globs

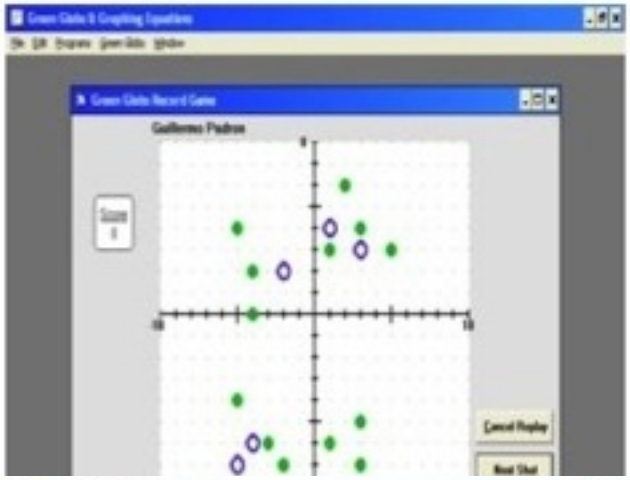

720p
Blip.TV (1280x720)
Blip.TV (1920x1080)
Blip.TV (720x480)
iMovie 08 Full (16:9) (1920...
iMovie 08 Large (16:9) (960...
iMovie HD (720x480)
iMovie HD MPEG4 (640x480)
iMovie HD Widescreen (869...
Large
Medium
NTSC (720x480)
PAL (720x576)
Input selection:
Record microphone audio
Record system audio
Audio quality:
Medium Quality, 20Khz
Audio will be compressed using AAC
Microphone Input:
Built-in Microphone
Microphone monitor:
Off
System audio monitor:
While previewing or recording
Level:
Video
Green Globs & Graphing Equations 3.3.1
Mouse clicks
None
Right clicks:
Capture size
962
w
601
h
Countdown:
0
Options
Show capture guide when not recording
Follow mouse cursor
Show capture guide when recording
Slow capture rate when not moving mouse
Edit recording area
Record
Pause
Abort
Finish
Remove Old Graphs
Undo Last Shot
Graph Equation

Guillermo's Big Score

My Globs Challenge

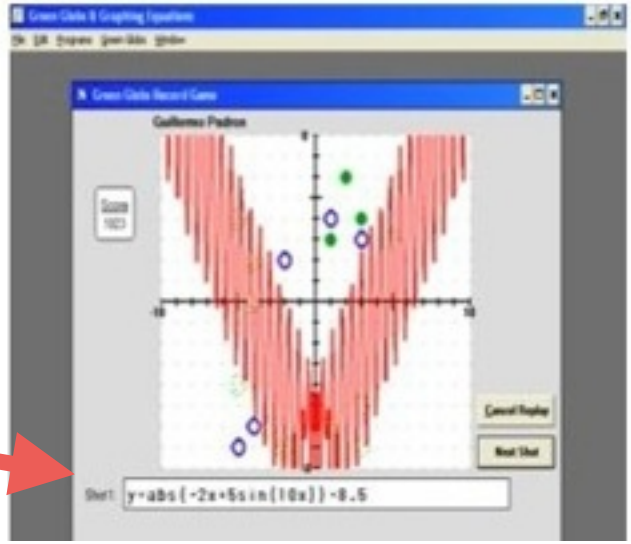
Guillermo Padron
Christa McAuliffe Middle School

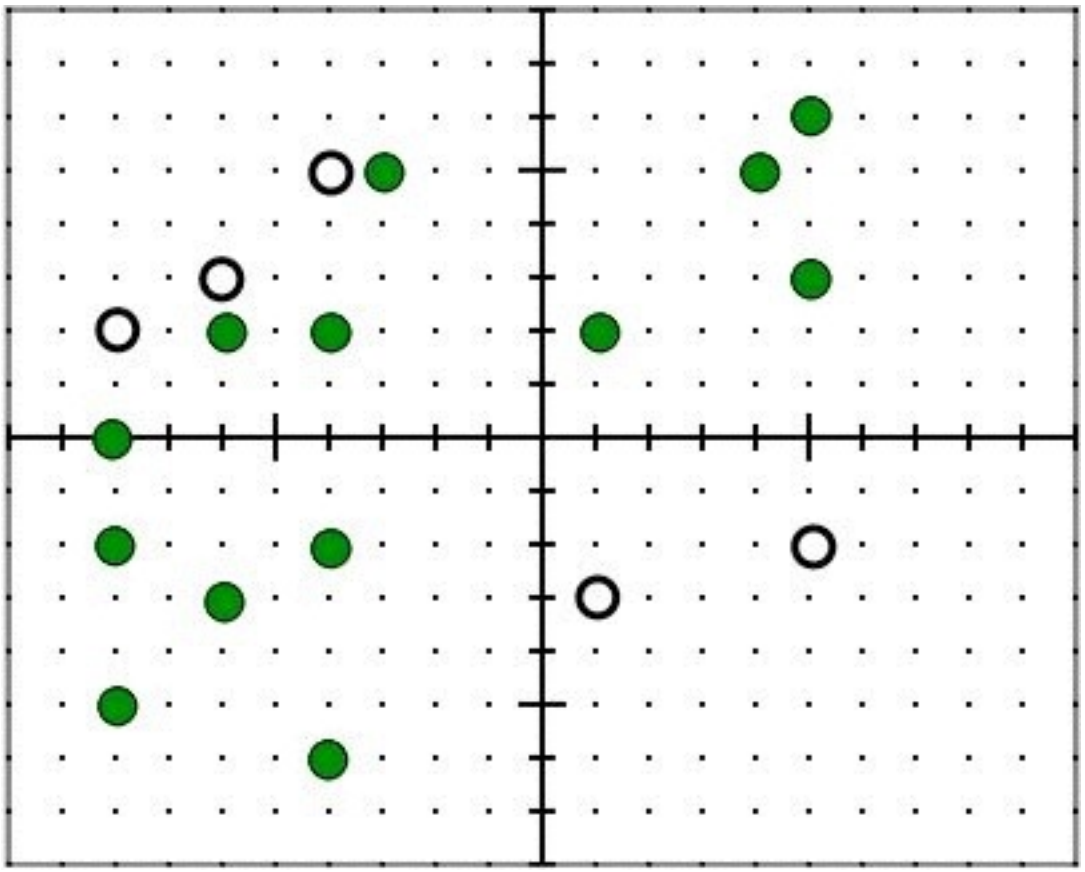
This is the newest Green Globs problem I did. I finished this problem with 1030 points. My highest score was 2050.



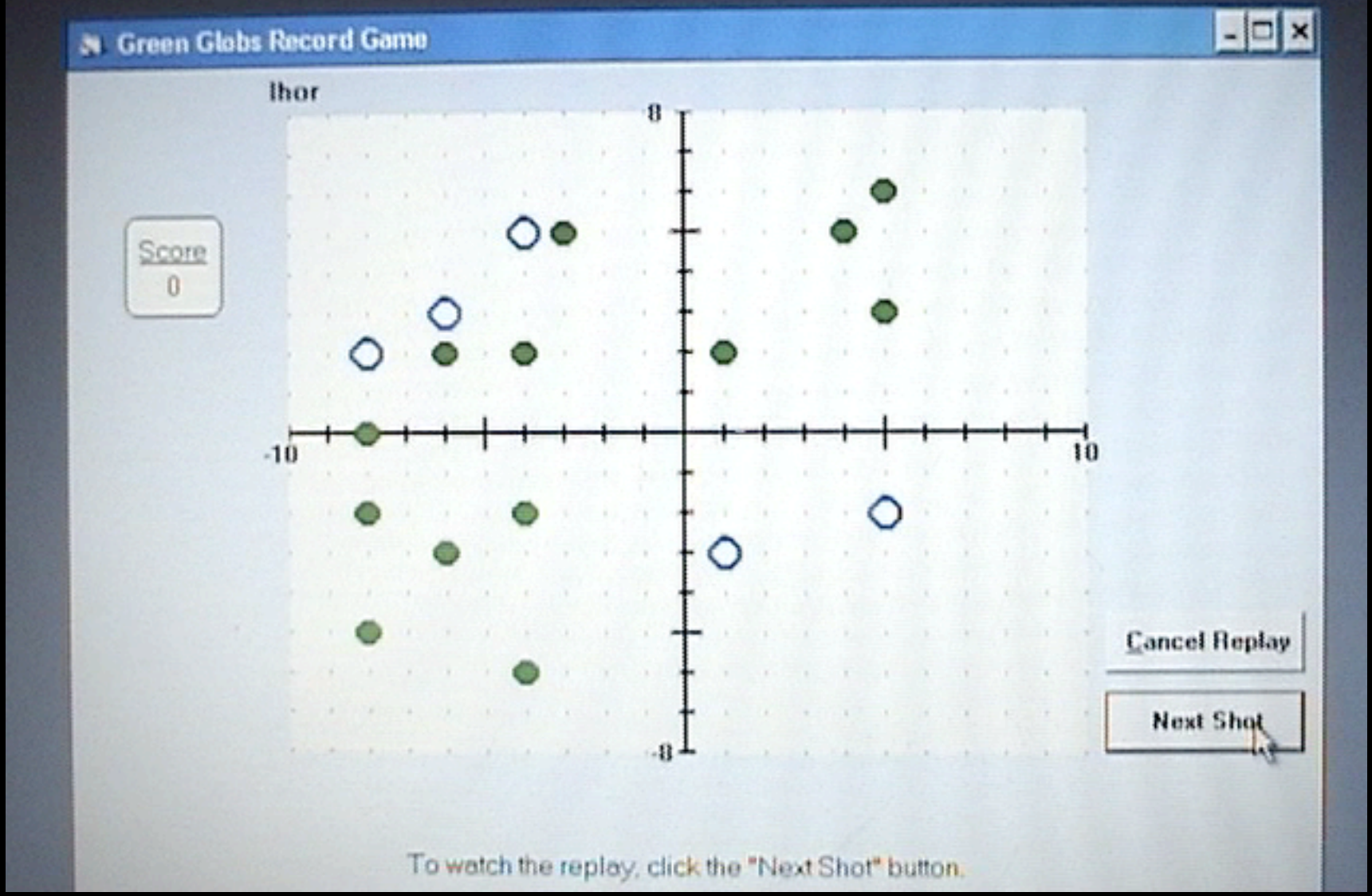
In my first shot, I used a combination of sine waves (the reason for the big waves), and absolute value (the reason for the awkward v-shape), to get all but three globs. I also alternated the slope to get a higher angle of the v and the y-intercept to move the v down.

y=abs(-2x+5sin(10x))-8.5





$y = 5.2 \sin(5.4x) + .8x + 2$


Green Globs Record Game
Ihor
Score
0
8
-8
-10
10
Cancel Replay
Next Shot
To watch the replay, click the "Next Shot" button.

Revised 11/1/08

The Great Green Globs Contest

This is a glob wearing his Jack O'lantern costume!

Game Day

Note that you do not need the software to compete in this contest. Just download the score sheets and fill out the equations that you think will give you the highest score for each game and send them to GGC Central. See instructions page.

1. Download the scoresheet and make a copy for each participant in the contest. If you are using the software Green Globs & Graphing Equations make sure the program is installed on all the participant computers and open to the Green Globs program.

2. Make sure the students have access to the game file on their computer. The file is available for download:

Game	PC	Mac

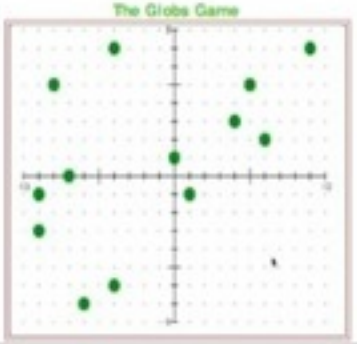
If you have any questions please contact globscontestcentral@mac.com

Submit your results here

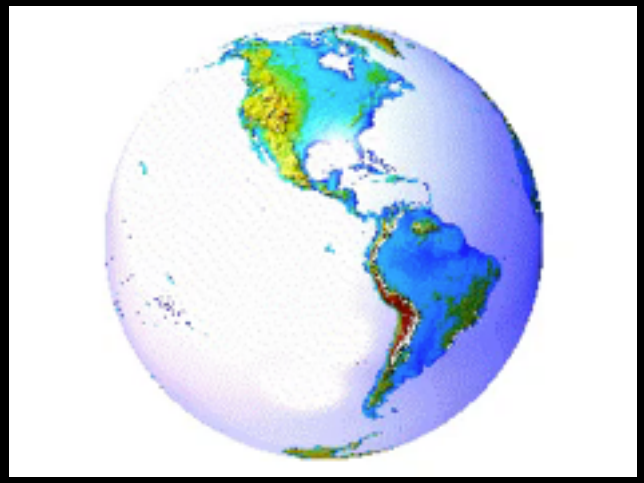
Instructions for playing Green Globs.

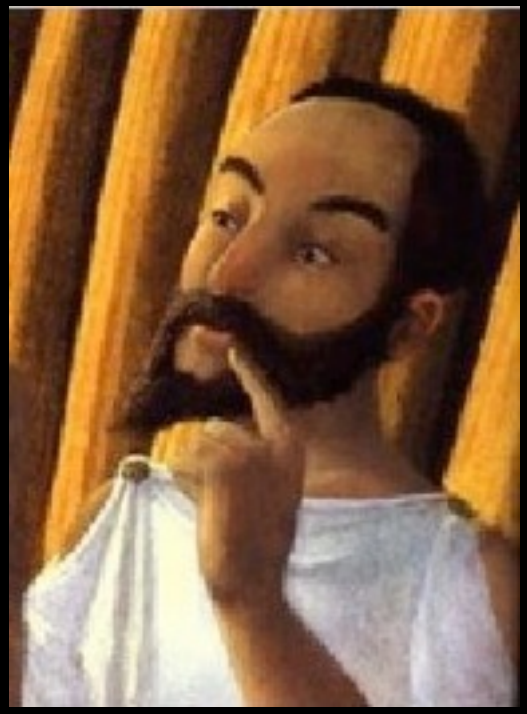
Instructions for Contest.

"Everything You Ever Wanted to Know about Equations, Lines, Slopes, and Graphs but Were Afraid to Ask" - Part 1 - Good intro to Green Globs! (Download word file.)



Story #5
How Round is the Earth?





Inquiring Minds want to Know...

Find out how it was done in 200 BC!

Method 3 -Find the circumference from the central angle

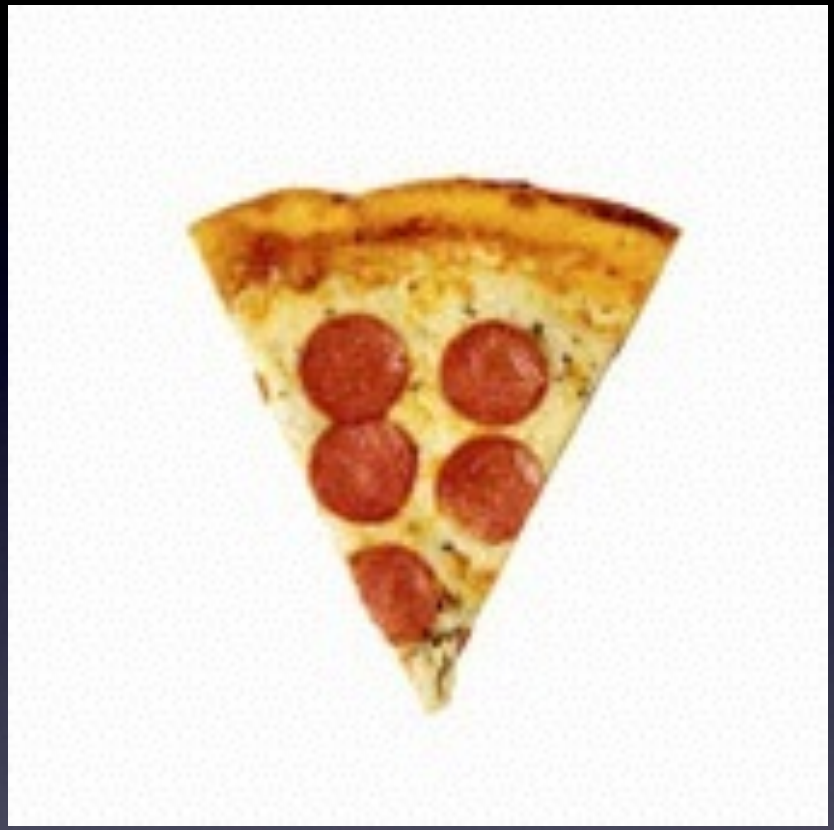
Eratosthenes may have imagined that the cross-section of the earth was like an grapefruit sliced in half. You could see the sections of the grapefruit. Also, if you walked along the edge of the grapefruit your path would be circular.

If you could determine the angle that the section makes at the center and length of the edge, you could figure out the circumference. Let's see how that would work.

Measuring an grapefuit's circumference.
Next Page

How round is it?

Alexandria



How round was the Pizza?

ERATOSTHENES MEASURES THE EARTH

You Tube version

MAY 14, 2008

The discovery that the Earth is a little world was made, as to many important human discoveries were, in the ancient Near East, in a time some humans call the third century BC, in the greatest metropolis of the age, the Egyptian city of Alexandria. Here there lived a man named Eratosthenes. One of his envious contemporaries called him "Beta," the second letter of the Greek alphabet, because, he said, Eratosthenes was second best in the world in everything. But it

To view video (above) see Noon Day Project Website

grapefruit3pages.gsp: 1

Show Places

Show Sector

Show Distance Measurement Circumference

Show central angle

Show Measurement Slices (360 / angle)

Show Distance Measurement Arc length

Show formula

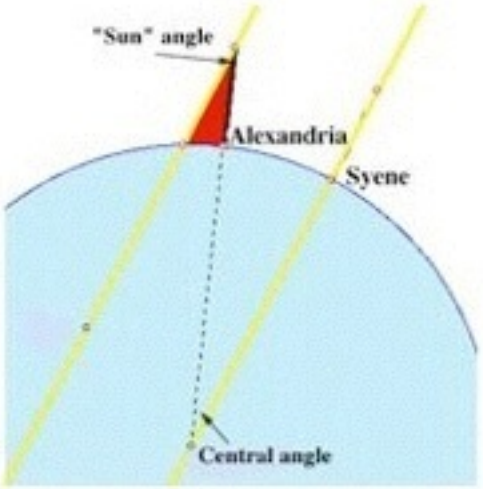
Show Distance Measurement Circumference

1 2 3 4

On my way to Sketchpad

Eratosthenes' Most Amazing Discovery: Measuring the Circumference of the Earth

One day while in his library in Alexandria (Egypt) Eratosthenes read that in the frontier outpost town of Syene at noon on June 21st, vertical sticks cast no shadows while a reflection of the sun could be seen at the bottom of the well. Being the scientist that he was, he wanted to know if the same thing happened in Alexandria. He discovered that there were shadows there. ←



2200 years ago, Eratosthenes measured the circumference of the earth to high accuracy. Here's how he did it.

He knew that if he could determine the central angle of the earth and knowing the distance from Alexandria to Syene (which he did), he could determine the circumference of the earth. But how can you measure the central angle? Eratosthenes used a little geometry to come up with his insight. Eratosthenes knew that the sun was far enough away so that its rays are parallel. In the diagram above note that there is no shadow at Syene while there is a shadow in Alexandria. Knowing this he came up with the marvelous discovery that the measured sun angle had to equal the central angle.

Kids find it's a big, big world

Old Trick to chart Earth's Circumference

Students at Westminster Academy participate in worldwide project

It was 2,200 years ago when a librarian in Egypt came up with a way to measure the earth's circumference. He knew the Earth was round, but wanted to know just how big it was. On May 1st, 2006 Ms. Murphy's 6th grade class replicated Eratosthenes's experiement coming up with surprisingly accurate results. Westminster was one of 152 classes around the world participating in an online project run by CIESE at Stevens Institute of Technology.


14/03/2008 10h18

Powerful Ideas

- Road Sign - Making Sense
- Darts - Numbers are masters of disguise
- Pizza - Graphs tell stories
- Jinx Puzzle - Power of the variable
- Globs - Algebra can be addicting!

Part 3 - The Debriefing

or what did we learn today?

Barry Fishman writes:

"... Based on my own research and experience, and the research of many colleagues in the learning sciences and related fields, I firmly believe that technology can transform teaching and learning environments and help students achieve beyond what is possible without the support of technology.

Nonetheless, it is a key challenge that must be met in order to employ technology effectively in school improvement efforts..."

It is a tremendous challenge to translate knowledge about teaching with technology from schools that are currently doing extraordinary things—both on their own and in the context of school improvement projects into knowledge that is broadly usable by the majority of schools.

Take The Fishman Challenge: From Extraordinary to Ordinary

CLIME | council for technology in math education
http: clime.org

Dynamic Math Classroom Press & Blog
http://DMCpress.org

The End