

## Overview of Classroom Adventure

- Select the book for use in the class.
- Spread out chapters in the book from the first week of school to the week before high- stakes testing.
- Sometimes I read a chapter after I have taught the mathematical concept.
- Focus today on the mathematics taught throughout the school year.


## Math is a Language

THE BORN LOSER


## THE HANDOUT

- Math is a language
- Website with power point http://rusmp.rice.edu
- Email for Carolyn White clwhite@rice.edu


## Chapter 1

- On the first night the Number Devil enters Robert's dream. Robert dislikes numbers.
- The number one is the mother of all numbers
- Infinitely small and even smaller numbers between 0 and 1
- The adventure with a stick of gum-vertical pieces



## Chapter 1

Navigating Through Algebra NCTM Lessons Prk-2 and 3-5

- Patterns on the hundreds board to devise divisibility rules
- Calculator patterns with TI 15



## Chapter 2

-Roman Numerals-Letters (no need for zero)
-Use minus numbers to arrive at zero $1+(-1)=0$
-Making numbers "Hop"
$5^{1}=5$
$5^{2}=25$
Robert talked with Mom next morning. She gave Robert hot chocolate because he said strange things.

## Chapter 3

- Robert wakes up in a cave.
- Division Day brings on two kinds of numbers
- "Garden Variety"
- "Prima Donnas"


## Chapter 3

Test for "Prima Donnas"- Prime Numbers

Sieve of Eratosthenes - National Library of Virtual Manipulatives (Utah State University)
http://nlvm.usu.edu/en/nav/frames asid 158 g 3 t 1.html

## Chapter 3

- Think of a number bigger than 5 .
- Think of three "Prima Donnas" that will add up to be that number.
- Consider the number 25.
- Possible solution:

- Consider the number 55
- Possible solution:



## Chapter 4

- Robert wakes up on a beach
- Use a calculator to investigate. $1 / 3 \approx 0.333$
multiply $0.333 \times 3$
multiply $0.3333 \times 3$
multiply $0.3333 . . . x 3$
What do you observe?
Will you ever get an answer larger than 1 ?


## Chapter 4

Review "hopping" numbers, $10^{3}=1000$

Hopping backwards is the "rutabaga" of a number.

The "rutabaga" of 100 is 10
What is the "rutabaga" of $225 ?$

## Chapter 5

Robert wakes up in a desert very thirsty. The Number Devil invites Robert up to the top of a palm tree to drink coconut milk. Coconut numbers are:


## Chapter 6

Robert and the Number Devil are in a potato field. They start working on "Bonacci" Numbers.

- $0,1,1,2,3,5,8,13, \ldots$ (add the last two to get the next)
- Make two adjourning "Bonacci" numbers hop, and you have another "Bonacci" number.
- "Bonacci"- Fibonacci Numbers in Nature

Fibonacci Numbers

Time for a nature walk to find leaves with sections representing numbers in the sequence:
$1,2,3,5,8 \ldots$


Fibonacci Numbers
Shasta daisy with 21 petals
What would happen when you say "She loves me, she loves me not?"

http://britton.disted.camosun.bc.ca/fibslide/jbfibslide.htm

## Chapter 7

- The Number Devil and Robert use cubes to build the "number triangle" and observe patterns.
- Before reading chapter 7, read the book, One Grain of Rice by Demi.




## Pascal's Triangle

The triangular numbers are found in the third diagonal of Pascal's triangle:


## Pascal's Triangle

The "shallow diagonals" of Pascal's triangle sum to Fibonacci numbers.


## Pascal's Triangle

- One color for the cells that contain a multiple of 3 .
- Second color for cells that contain numbers that are one less than a multiple of 3 .
- Third color for cells that contain numbers that are two less than a multiple of 3.





## Chapter 8

Discuss combinations and permutations using 2,3 and 4 students in seating arrangements. Shorter way of writing is 4 !
Read as : four "vroom"

| Children | Possibilities |
| :---: | :--- |
| 1 | 1 |
| 2 | $1 \times 2=2$ |
| 3 | $1 \times 2 \times 3=6$ |
| 4 | $1 \times 2 \times 3 \times 4=24$ |



## Chapter 8

Robert is in class with classmates
Combinations using handshakes:

| People | Handshakes |
| :---: | :---: |
| 1 | 0 |
| 2 | 1 |
| 3 | 3 |
| 4 | 6 |

## Chapter 9

The Chapter begins with Robert sick in bed with the flu. The Number Devil decides that this will be a quiet evening. There is a review of numbers discussed:

- "Prima Donnas"
- "Garden Variety"
- "Hopping Numbers"
- "Coconuts"
- "Rutabaga of a Number"
- "Bonacci Numbers"
- "Vroom!"


## Chapter 10

## Geometry Night

Pick's Formula provides an elegant formula for finding the area of a simple lattice polygon.
A lattice polygon is a polygon whose boundary consists of a sequence of connected nonintersecting straight-line segments.

## Chapter 10

## Geometry Night

Pick's Formula: Area $=I+B / 2-1$ where
$I=$ number of interior lattice points and
$B=$ number of boundary lattice points .
For example, the area of the simple lattice polygon in the figure is $31+15 / 2-1=37.5$

http://math.nyu.edu/~crorres/Archimedes/Stomachion/Pick.html

## Chapter 10

## Euler's Formula

$$
V-E+F=2
$$

$\mathrm{V}=$ number of vertices
$E=$ number of edges
$F=$ number of faces

For example in a Cube
V = 8
$E=12$
F = 6
8-12+6=2


## The Ending

In the last dream, the Number Devil gives an invitation to Robert to attend a dinner.

A special surprise is given to Robert.


## The Ending

Robert is identified as an apprentice and bestowed the recognition of being in the "Order of Pythagoras, Fifth Class"
And receives a gold star around his neck.

## Students

- Read the last chapter of the week before high-stakes testing.
- Students receive a gold star/coin.




## BIBLIOGRAPHY

## Number Patterns

http://forum.swarthmore.edu/workshops/usi/pascal/pascalnumberpatterns.html

## Pascal Unit

http://forum.swarthmore.edu/workshops/usi/pascal/index.html

## Coloring Sheet for Multiples and 3D Box

http://forum.swarthmore.edu/workshops/usi/pascal/mid.color pascal.html

Enzensberger ,Hans Magnus. The Number Devil A Mathematical Adventure. Henry Holt and Company,INC.:1998 ISBN 0-8050-5770-6

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 Folktale. Scholastic Press: 1997 ISBN 0-590-93998-X
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