Launching SCHEMaTC: South Carolina High Energy Mathematics Teachers Circle

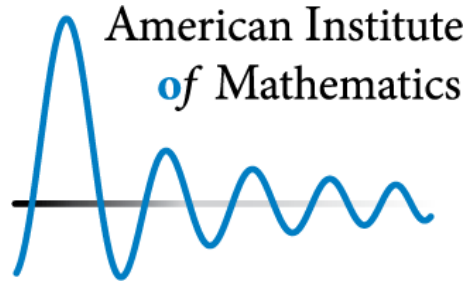
Debra Geddings [2] George McNulty [2] Nieves McNulty [1]
Douglas Meade[2]

[1]Columbia College

[2]University of South Carolina

MathFest 2012
Madison, Wisconsin

Getting Started



We participated in the June 2011 Math Teachers Circle Workshop at the American Institute of Mathematics in Palo Alto. Thanks for the ideas and support! Our special thanks to Brianna Donaldson, Brian Conrey, and all the facilitators at that workshop. There we laid out a preliminary plan.

Getting Started

During 2011–2012 we prepared a grant proposal to the South Carolina Commission on Higher Education for federal ITQ funding to support our circle.

Getting Started

We created a partnership between the arts and science divisions at Columbia College and the University of South Carolina, the College of Education at the University of South Carolina and two high need school districts in our area. We also recruited middle school math teachers from other schools in the Columbia area.

Getting Started

We selected Dr. Diana White to be the evaluator of our project.

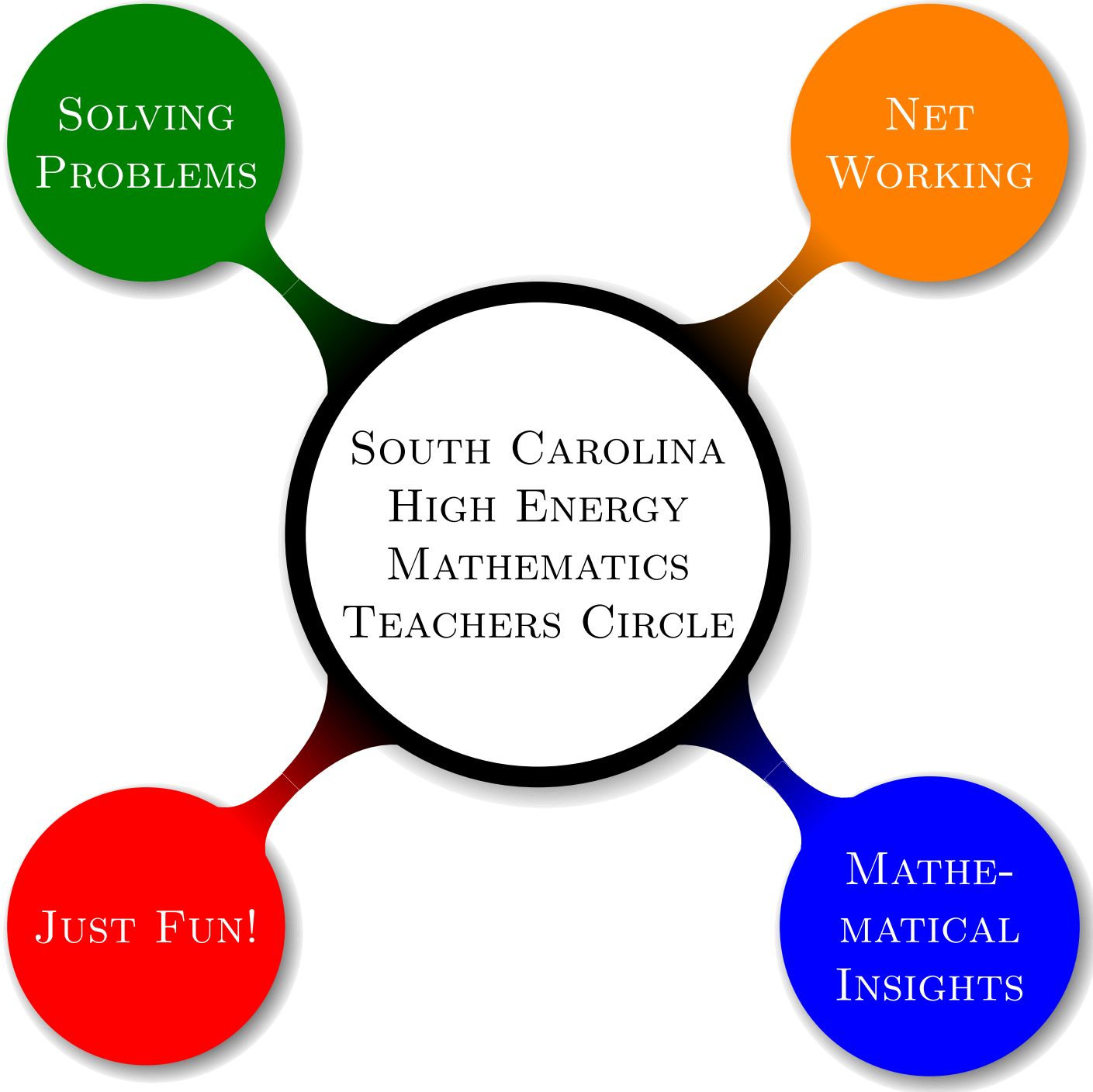
Getting Started

Our Circle is funded by a grant from the South Carolina Commission on Higher Education and the U.S. Department of Education under the auspices of the Improving Teacher Quality Higher Education Grant Program We appreciate this support!

Getting Started

Our Summer Immersion Workshop was held last week at Hickory Knob State Resort Park in South Carolina. 16 middle school teachers and 7 college faculty members participated. Several others could not attend but plan to participate during the coming academic year.

Getting Started

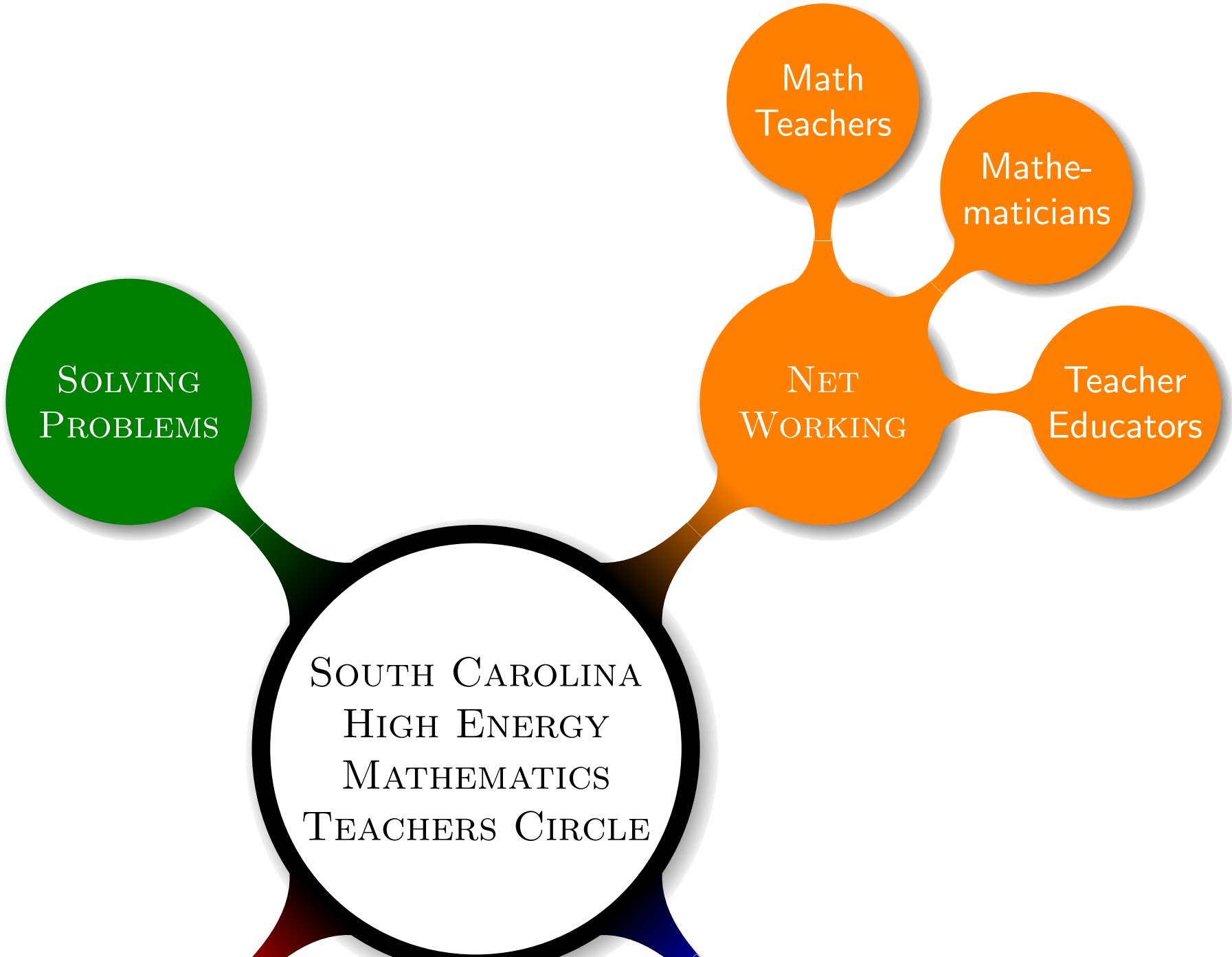

Solving Problems
Net Working
South Carolina High Energy Mathematics Teachers Circle
Just Fun!
Mathe-matical Insights


Draw a Picture
Just Try It!
Gen-eralize
Try Some-thing Easier
Solving Problems
Partial Solutions
Sleep on It
Net Working
South Carolina High Energy Mathematics Teachers Circle

A Problem of Vladimir Arnold

Suppose we have a barrel of wine and a cup of tea. A teaspoon of wine is taken from the barrel and poured into the cup. After stirring, a teaspoon of the mixture is taken from the cup and poured into the barrel. Now the barrel contains some tea and the cup contains some wine. Which volume is larger—that of the tea in the wine or of the wine in the tea?

From *Problems for Kids from 5 to 15*
V. Arnold 2004

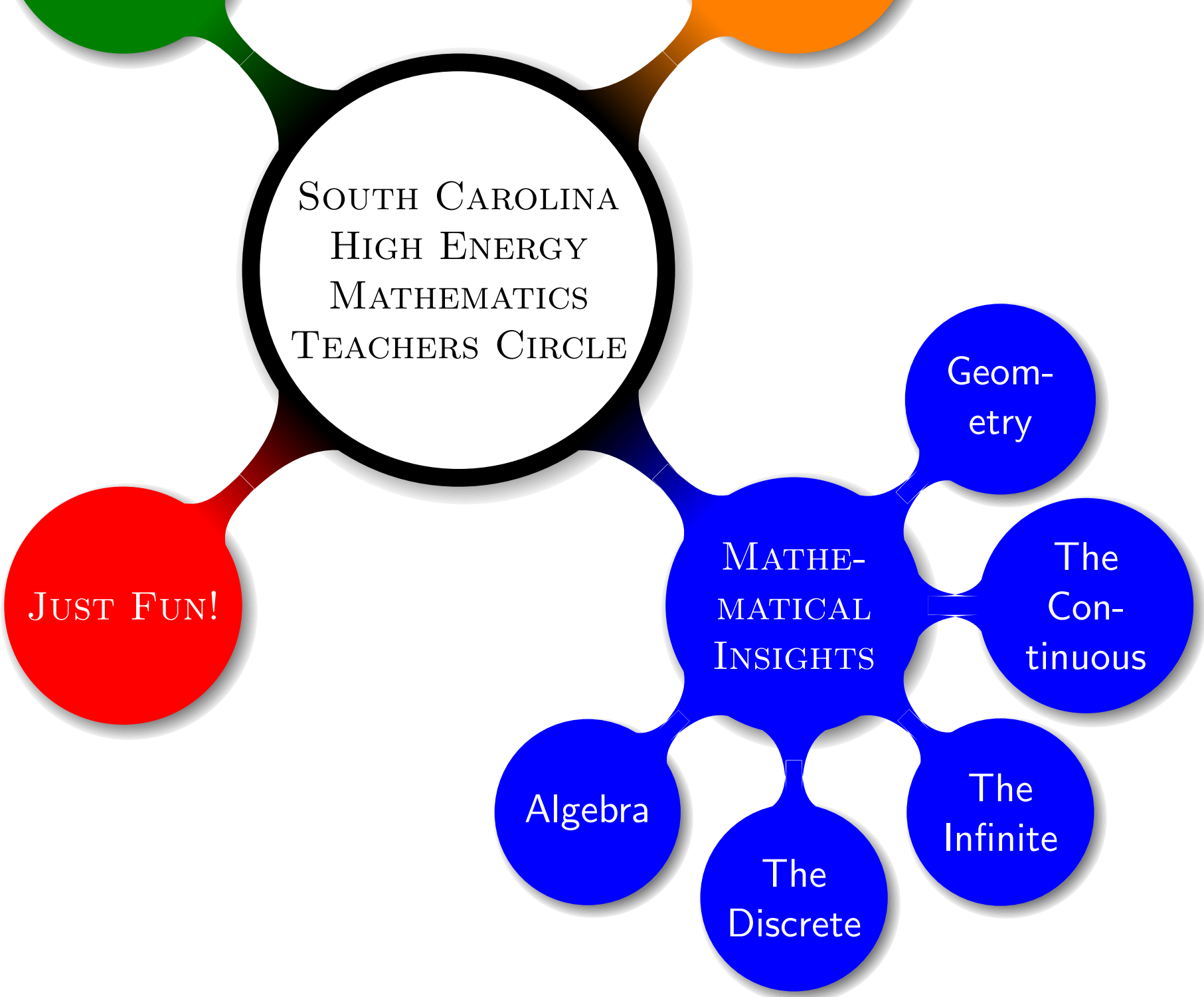

Math Teachers
Mathe-maticians
Net Working
Teacher Educators
Solving Problems
South Carolina High Energy Mathematics Teachers Circle


Logic
USO


07/27/2012

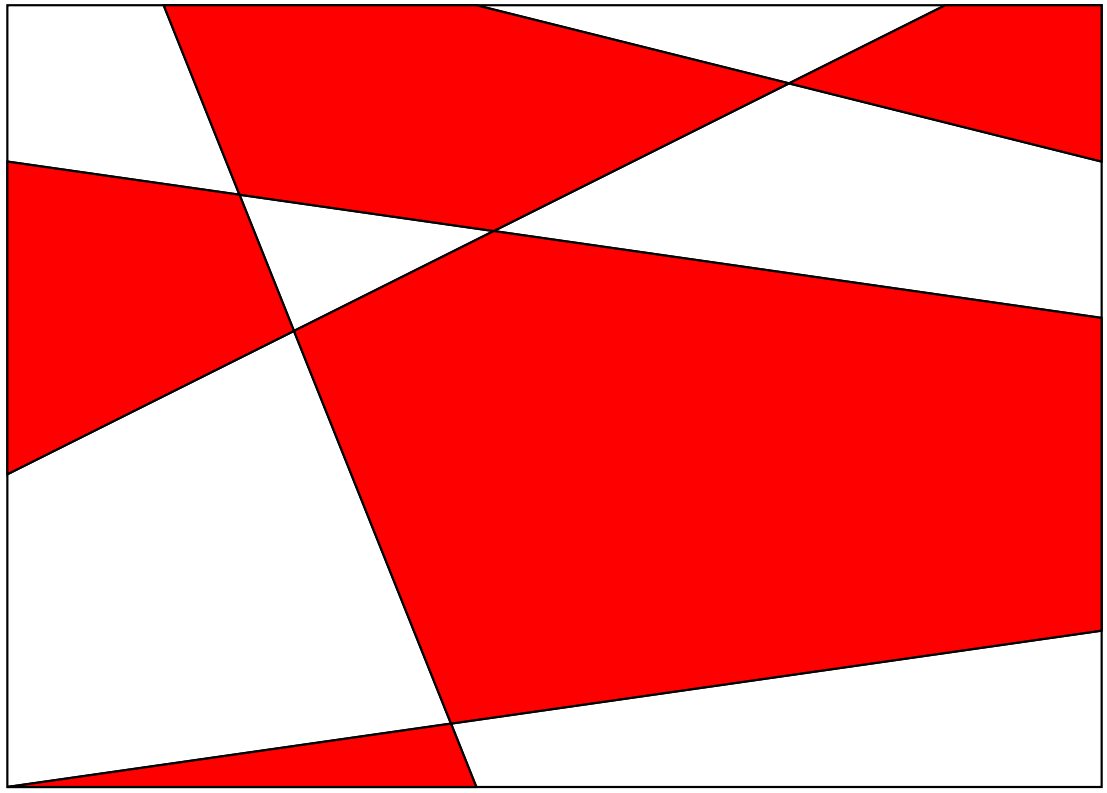

07/25/2012


07/27/2012


South Carolina High Energy Mathematics Teachers Circle
Just Fun!
Mathe-matical Insights
Geom-etry
The Con-tinuous
Algebra
The Discrete
The Infinite

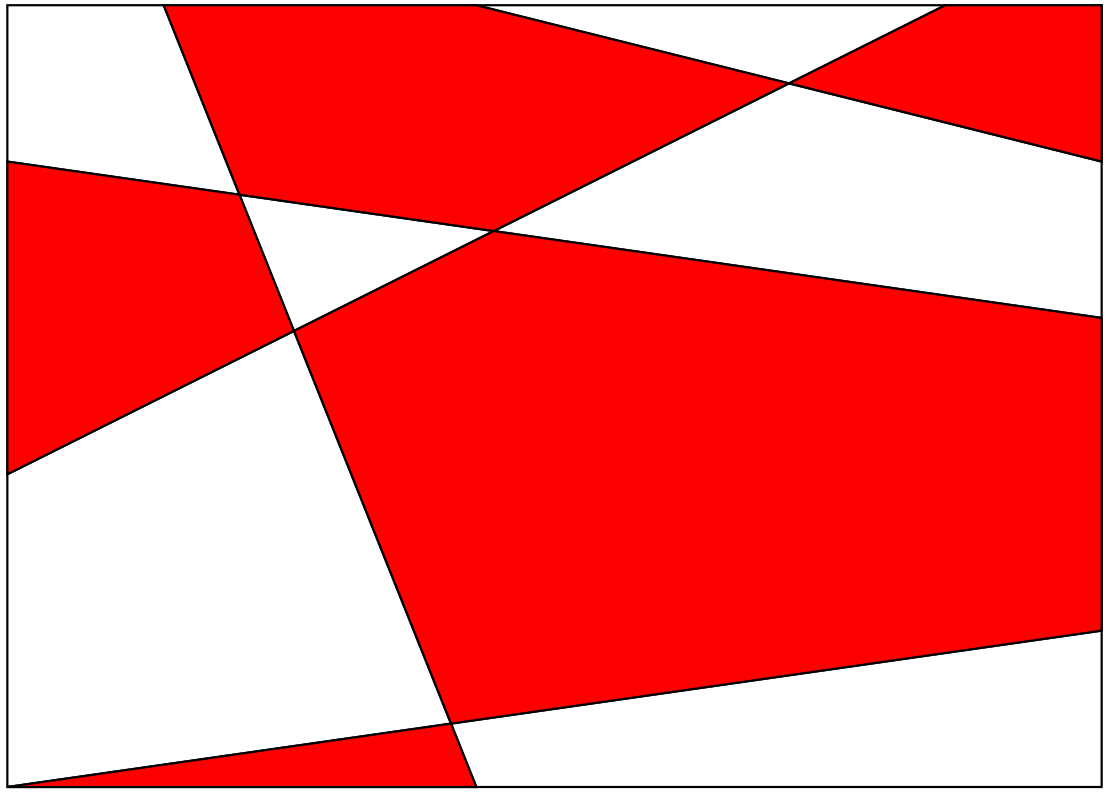
Coloring Maps Led to Induction

Maps with Straight Line Boundaries



These can always be colored with just two colors!

Maps with Straight Line Boundaries



These can always be colored with just two colors!

We convinced ourselves with Mathematical Induction.

Induction: Counting Squares in an $n \times n$ Grid

This got us to

$$\sum_{k=1}^{n} k^2.$$

Induction: Counting Squares in an $n \times n$ Grid

This got us to

$$\sum_{k=1}^{n} k^2.$$

An easier formula to compute this sum would be nice!

Induction: Counting Squares in an $n \times n$ Grid

This got us to

$$\sum_{k=1}^{n} k^2.$$

An easier formula to compute this sum would be nice! A mathematician knew the formula:

$$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{2 \cdot 3},$$

Induction: Counting Squares in an $n \times n$ Grid

This got us to

$$\sum_{k=1}^{n} k^2.$$

An easier formula to compute this sum would be nice! A mathematician knew the formula:

$$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{2 \cdot 3},$$

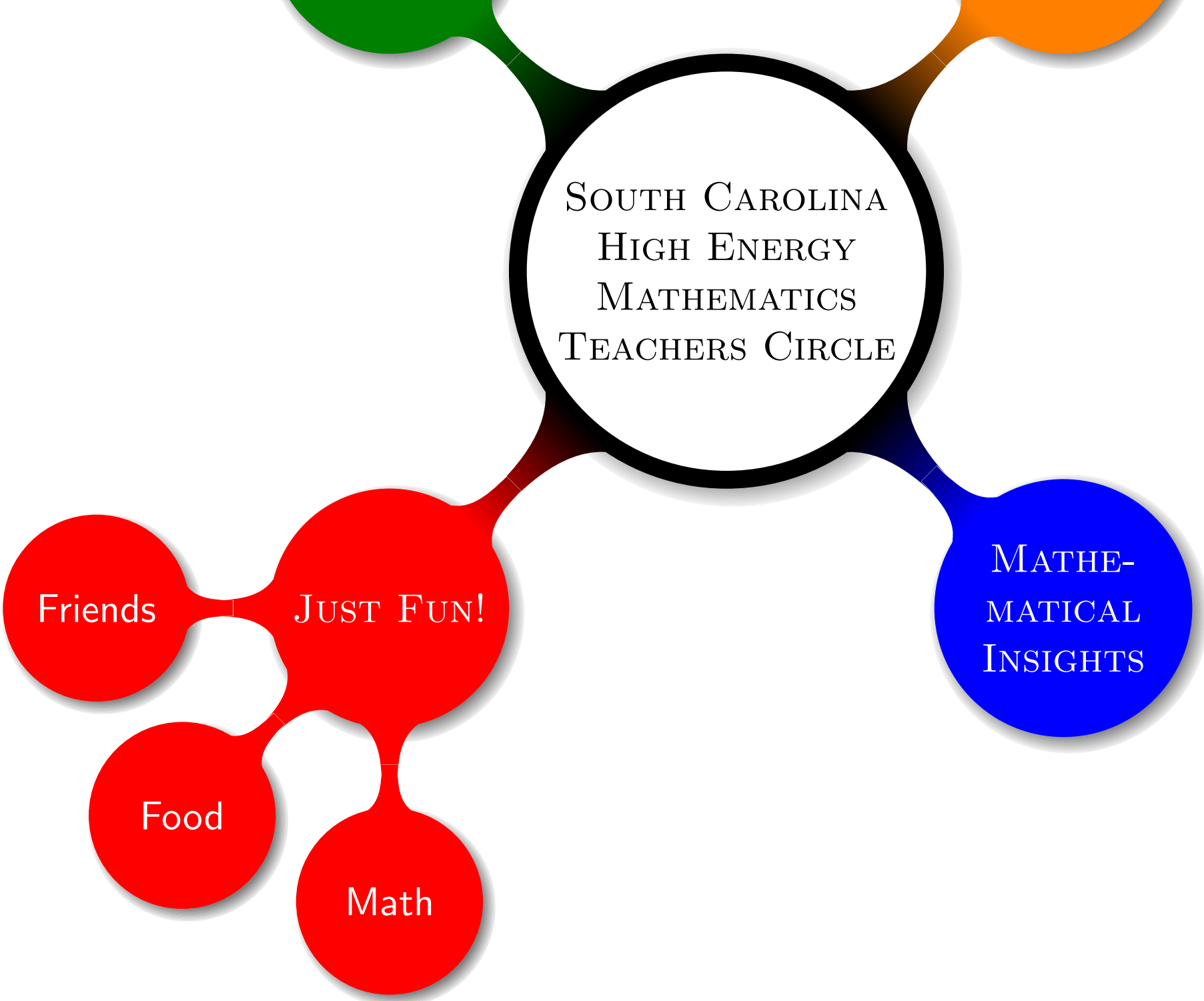
but how can anyone be sure of it?

Mathematical Induction

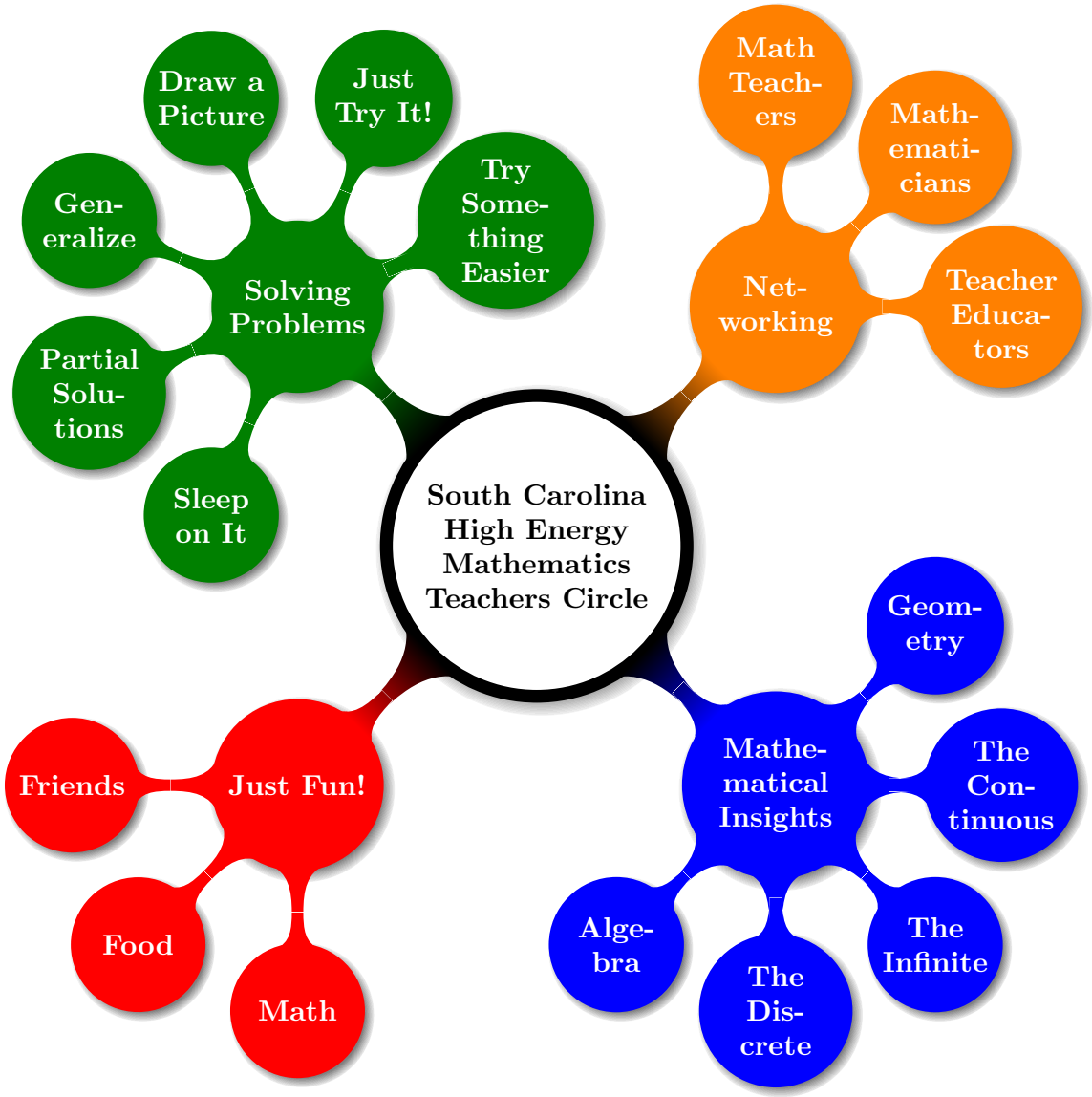
We saw induction earlier. We used it to prove that every map on the plane with (infinite) straight line boundaries could be colored by two colors!

We tried it on that formula, working in groups on the base step and the induction step.

We were convinced that the formula was true BUT had no idea where the formula came from (apart from some mathematician's mind).


South Carolina High Energy Mathematics Teachers Circle
Just Fun!
Friends
Food
Math
Mathe-matical Insights


EXIT
Problem Solving Strategies
Chunking
Represent with models
Make a mistake
Algebraic thinking
Substitute values into problem
Solve a simpler problem
Change to another problem (similar)
Work backwards
Guess and check Trial and Error
Tables/Graphs/Patterns/ Lists
KERRA


South Carolina High Energy Mathematics Teachers Circle
Solving Problems
Draw a Picture
Just Try It!
Try Some-thing Easier
Gen-eralize
Partial Solu-tions
Sleep on It
Net-working
Math Teach-ers
Math-emati-cians
Teacher Educa-tors
Just Fun!
Friends
Food
Math
Mathe-matical Insights
Geom-etry
The Con-tinuous
The Infinite
The Dis-crete
Alge-bra

What's Next

- We will meet three times this fall and four times in the spring.
- Our meetings will be on Saturday from 9:30 a.m. to 1:30 p.m.
- In June 2013 we have scheduled an Emergence Circle Workshop.
- We will explore the possibilities of launching a second Math Teachers Circle in the Columbia area.

It's a Circle!