Whole-Class Mathematical Discourse:
Creating Cultures of Participation

Dr. Cory A. Bennett
Idaho State University
benncor3@isu.edu

Background
Meaningful interactions are built upon cultures of collaboration (NCTM, 1991).

The norms and culture of classrooms are "highly critical" elements in establishing mathematical discourse amongst students (Rigelman, 2010).

National Board Certification
15 minute video, unedited, facilitating a whole class discussion

_____
_____
_____
_____
_____
_____

Discourse in Mathematics
What is discourse?
Meaningful discourse includes an element of debate and is an interactive, dynamic, and inclusive strategy with the intent of developing particular mathematical concepts or practices

How does it support mathematical reasoning?
Meaningful discourse includes an element of debate and is an interactive, dynamic, and inclusive strategy with the intent of developing particular mathematical concepts or practices

Discourse develops more creative and independent thinkers while simultaneously strengthening procedural knowledge (Mercer, 2008)

What is the teacher's role?
"Facilitator"

_____
_____
_____
_____
_____
_____
_____

How do we create cultures of participation?
What does a mathematical culture of participation look like?
1) are inclusive
2) value & respect all individuals' comments & ideas
3) maintain accountability for all members
4) expect contributions from all
5) engage in discursive interactions-open sharing of ideas
6) students & teacher collectively shape understandings

_____
_____
_____
_____
_____
_____

<u>5 Areas to Consider</u>
1. Classroom Setting
2. Classroom Procedures
3. Structural Aids
4. Teachers' Role
5. Student Affective Development

_____

_____

_____

<u>Classroom Setting</u>
Rules
Collaborative creation

Desk arrangements
Small Groups

We are "mathematicians"
Student mathematicians

_____

_____

_____

_____

<u>Classroom Procedures</u>
Set number of responses

Wait time

Name Cards

Hold after class

_____

_____

_____

_____

<u>Structural Aids</u>
How do we get kids involved?

Activities to build cultures of Participation

Accessible Explorations
Differentiated
Student choice

Partner/Meeting Schedule

Randomized participation

_____

_____

_____

_____

_____

_____

Conferences

Partners

1._____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

6. _____

_____

7. _____

_____

8. _____

_____

Teams

Germain

_____

_____

_____

_____

_____

Ramanujan
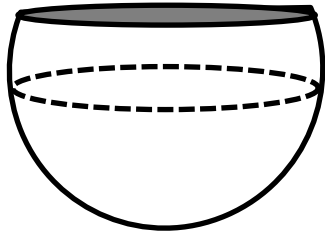
_____

_____

_____

_____

Archimedes

_____

_____

_____

_____

_____

Examples of tiered & differentiated problems dealing with the Pythagorean Theorem

Forensics
A knife cuts a portion off the top of a spherical orange, which has a radius of five centimeters, four centimeters from the center of the orange. What is the area of the circle that was created by the cut?

Detectives
A fly is sitting on one corner of a sugar cube that has a volume of one cubic inch. Only walking, what paths might the fly take to get to the opposite corner and which is the shortest possible path it can take?
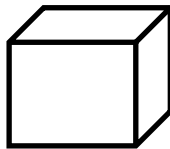
Yellow Tape
Starting from Sunny Harbors, a boat sails due west for four miles, then due south for nine miles, and then due west for ten miles. How far is the boat directly from the harbor?