Exit Ticket

3	**New Ideas**	
2	**Things I will use**	
1	**Question I still Have**	

Investigating the Standards for Mathematical Practice

Sample HS Mathematics Task:

A company wants to promote a certain product. Each month they spend the same amount of money on advertising. Sales increase slowly for the first 3 months. During months 4-9, sales appear to increase exponentially. Beginning with month 10, sales continued to increase but at a declining rate. Draw a graph that could represent sales for the first 15 months. Create a table that could represent your graph. Symbolically represent each region of the graph. Explain why your graph is a reasonable representation of the situation.

Adapted from Heinemann Open-Ended Assessment in Math
http://books.heinemann.com/math/

- Read the two practices assigned to your group.
- Solve the problem.
- What evidence of each of the two practices might students demonstrate as they work through this problem?

Standard for Mathematical Practice		Evidence
Practice _____:		
Practice _____:		

Read page 10 of the IC: 'Connecting the Standards for Mathematic Practice to the Standards for Mathematical Content'.

The most important idea is _____.

Roam the Room: When time is called, everyone "roams the room" to exchange important ideas with someone from another table. When time is called, repeat. Then sit down.

Activity #2

Investigating the Structure
Part 1: Overview of Conceptual Categories

- Divide the six indicated Conceptual Categories (Number and Quantity, Algebra, Functions, Modeling, Geometry, Statistics and Probability) among the people in your table groups.
- Each person read the assigned **category narrative** and write important ideas below.
- Decide on 3 points to share with the entire group from your notes you recorded.
- Follow the protocol for **Stand and Share**:
    1. All the people who read a particular conceptual category stand.
    2. Each shares 1 point from his/her chart.
    3. As ideas are shared, persons who have no "unshared ideas" to contribute sit down.
    4. Repeat for the other conceptual categories.

Important Ideas	Questions, Thoughts, Epiphanies
Number and Quantity (p.59)	
Algebra (p. 63)	
Functions (p. 68)	
Modeling (p. 73 & 74)	
Geometry (p. 75 & 76)	
Statistics and Probability (p. 82)	

Activity #3
Investigating the Structure
Part 2

- For each standard below, predict the Conceptual Category in which it will be found. Then from the overview page for that category, predict the domain for that standard.
- Find all the elements (Conceptual Category, Domain, etc.) and note them in the table below.
- Discuss your predictions. What did you learn?

Standard	Conceptual Category	Domain	Cluster Heading	Code
Rewrite expressions involving radicals and rational exponents using the properties of exponents.				
Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★				
(+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.				
IA.9.Model and solve problems using at least two of the following fundamental graph topics and models: Euler paths and circuits, Hamilton paths and circuits, the traveling salesman problem (TSP), minimum spanning trees, critical paths, vertex coloring.★				

Activity #4

Investigating the Content Standards

1. Revisit the problem from Activity 1.

   Find the **content standards** that were addressed by the problem.

   For efficiency, assign conceptual categories to individuals at the table.

2. Note which standards you record that represent **modeling**.

Problem from Activity 1:

A company wants to promote a certain product. Each month they spend the same amount of money on advertising. Sales increase slowly for the first 3 months. During months 4-9, sales appear to increase exponentially. Beginning with month 10, sales continued to increase but at a declining rate. Draw a graph that could represent sales for the first 15 months. Create a table that could represent your graph. Explain why your graph is a reasonable representation of the situation.

Conceptual Categories	Standard Codes
Number and Quantity	
Algebra	
Functions	
Geometry	
Statistics and Probability	

Which standards that your group identified indicate modeling?

Activity # 5

Investigating Mathematical Understanding

Begin a "line of learning" by responding to this question:

What is the meaning of "mathematical understanding"?

1. Reflect on the following problems:

   Here are the ages of six children: 13, 10, 8, 5, 3, 3. What is the average age of the children?

   Edith has an average (mean) score of 80 on five tests. What score does she need on the next test to raise her average to 81?

   - What is the difference between them? Why might solving the second problem require deeper mathematical understanding than the first? Discuss with your elbow partner.

   - In your table groups, describe math classroom situations that portray an example and a non-example of "mathematical understanding".

Example	Non-example

   - Draw a line under your response on the previous page and again reflect on

   ## What is the meaning of "mathematical understanding"?

2. Read page 3 and the first paragraph on page 6 in the IC Mathematics.

   - Draw a line under your response on the previous page and again reflect on

   ## What is the meaning of "mathematical understanding"?

3. View the following video, "Math Class Needs a Make Over" featuring HS Math Teacher, Dan Meyer.

   - Draw a line under your response on the previous page and again reflect on

   ## What is the meaning of "mathematical understanding"?

4. Share your final writing with your group or partner.

Activity #6
Investigating Vertical Connections

- Given the Cluster Heading in the chart below, record related prior and future learning necessary for student success.
- Discuss and note these connections in the chart below.

Prior Standard	Cluster Heading	Future Standard	Concerns/Questions
	H.S. Geometry **Prove theorems involving similarity**		
	H.S. Statistics & Probability **Summarize, represent, and interpret data on a single count or measurement variable**		
	H.S. Functions **Construct and compare linear, quadratic, and exponential models and solve problems**		

Activity #7

Reflection

New Things I Learned about the IC Mathematics

Practices	Content	Miscellaneous

Reflect on the activities completed today. How will you take this process back to your colleagues for investigations at your school/district? Jot your "next steps" in the chart below.

Next Steps for Future Standards Investigations		
Self	Math Teachers	School/District