Differentiating in Math Class

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Agenda

1. Introduction
2. One problem, multiple concepts
3. One problem and concept, different conditions
4. Different problems, same concept
5. Wrap-up

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What is Differentiation?

- Organizing learning experiences so that ALL students are productively engaged in building new knowledge.

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Two Charges of Differentiation

(according to Rick Wormeli)

- Do whatever it takes to maximize students' learning instead of relying on one-size-fits-all, whole-class method of instruction.
- Prepare students to handle anything in their current and future lives that is not differentiated, i.e., to become their own learning advocates.

Wormeli, R. (2007). *Differentiation: From planning to practice, grades 6-12*. Portland, ME: Stenhouse Publishers. p. 9.

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Why Differentiate?

- Differentiating learning experiences ensures that all learners can engage productively with math content
- Everyone is challenged; no one is bored

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Three Differentiation Strategies for Math Class

1. One problem, multiple concepts
2. One problem and concept, different conditions
3. Different problems, same concept

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Strategy One:

One Problem, Multiple Concepts

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Going Skating

- Solve the following problem **at least three different ways**:
- You are going ice skating with some friends for your birthday. You and two of your friends own skates; the rest of your friends must rent. At Ice Kingdom you would pay $5 per person and another $3 per skate rental. At Cool Palace they charge $7.25 per person but rentals are included. Where should you go for your party?
- Can you find a fourth method? A fifth? … How many methods can you find?

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Strategy Two:

One Problem And Concept, Different Conditions

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Skating Variables

- Solve the following problem **using [insert your strategy of choice here]**:
- You are going ice skating with some friends for your birthday. You and two of your friends own skates; the rest of your friends must rent. At Ice Kingdom you would pay $***a*** per person and another $***b*** per skate rental. At Cool Palace they charge $***c*** per person but rentals are included. Where should you go for your party?
- You will be given a sticky note with your values of a, b, and c.

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Skating Variables, cont.

- The table below shows the values of *a*, *b*, and *c* that I gave you (or you found) and the resulting value of n , where n stands for the number of skaters when the costs are the same:

a	b	c	n
4	2	5	6
10	4	2	1
8	1	3	0.5
3	2	5	No solution
5	4	10	-12
3	5	6	7 1/2

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Least Common Multiple

- Find the least common multiple of *a* and *b*, when … [you will get a sticky note with your values for *a* and *b*].
- In your group determine: What pairs of values could you give students?
- Consider:
  - Are the pairs of values getting at the same idea even though they are different?
  - Are the pairs of values different levels of complexity?

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Strategy Three:

Different Problems, Same Concept

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Negative x Positive = Negative

Problem 1: Patterning

Examine the pattern. Fill in the blanks.

4 x 3 = 12 **minus 4**
4 x 2 = 8 **minus ___**
4 x 1 = 4
4 x 0 = 0 _____ ___
4 x (-1) = ___ _____ ___
4 x (-2) = ___ _____ ___

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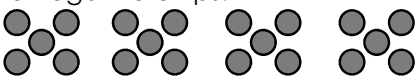
Negative x Positive = Negative

Problem 2: Groups of Negative Chips

- Create a chip board with four groups of 5 negative chips.



- What number sentence could you write for this chip board?
- What is the solution to the number sentence?

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Negative x Positive = Negative

Problem 3: Accumulated Debt

- You owe your mom $5 every time you forget to do your weekly chores.
- You forgot to take out the trash for the last 4 weeks straight.
- How much money have you accumulated?

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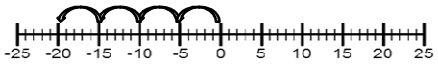
Negative x Positive = Negative

Problem 4: Hops on a Number Line

- Draw a number line representing four hops of -5 each time.



- What number sentence could you write for this number line?
- What is the solution to the number sentence?

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Negative x Positive = Negative

- What do the four problems have in common?
  - patterning
  - groups of negative chips
  - accumulated debt
  - hops on a number line
- Can you develop other problems that get at the same core concept?
- How might you choose which problem to use when?

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The Take-Home Message

- We explored three strategies for differentiating in math class:
  - One problem, multiple concepts
  - One problem and concept, different conditions
  - Different problems, same concept
- Differentiating learning experiences ensures that all learners can engage productively with math content

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Resources

- Today's presentation handout: **tinyurl.com/Wilmington2014**
- Email me: Ann Gaffney at **gaffneyedcons@gmail.com**

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