# Differentiating

# in Math Class

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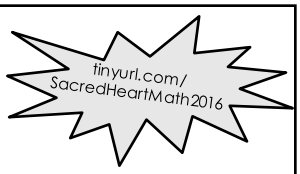
## Agenda




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




## What is Differentiation?

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




## 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.




## Why Differentiate?

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




## Three Differentiation Strategies for Math Class

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

Strategy One:

**One Problem,**

**Multiple Concepts**




## 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?




Strategy Two:

**One Problem And Concept, Different Conditions**




## Skating Variables

- Solve the following problem **using [insert your strategy of choice here, e.g., table/chart, equation, etc]**:
- 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***.




## 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 |
| 3 | 5 | 6 | 7 1/2 |
| 3 | 2 | 5 | ø |
| 3.25 | 10 | 12.5 | 40 |
| 4.25 | 5.50 | 8 | 9 3/7 |

**Ice King is always cheaper if there are less than n skaters.**

**Cool palace is cheaper if there are more than n skaters.**




## 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?

Strategy Three:

**Different Problems,**

**Same Concept**




## Negative x Positive = Negative

Problem 1: Patterning

Examine the pattern. Fill in the blanks.

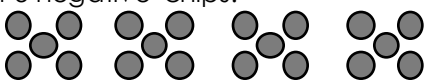
4 x 3 = 12 **minus 4**
4 x 2 = 8 **minus ___**
4 x 1 = 4 _____ ___
4 x 0 = 0 _____ ___
4 x (-1) = ___ _____ ___
4 x (-2) = ___ _____ ___




## 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?




## Negative x Positive = Negative

Problem 3: Accumulated Debt

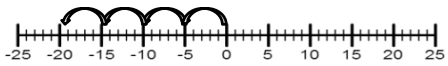
- You owe your mom $5 every time you forget to do your weekly chores.
- You forgot to take out the trash for the last 4 weeks straight.
- How much money have you accumulated?




## 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?




## 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?

## 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




## Resources

- Today's presentation handout: **tinyurl.com/SacredHeartMath2016**
- Email me: Ann Gaffney at **gaffneyedcons@gmail.com**

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