Creative Teaching
----Appeal to senses----
Nov. 8, 2013

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Learning from Danica McKellar:
"Math Doesn't Suck"
http://www.mathdoesntsuck.com/

The contents

- Motivation: Why creative teaching?
- Proposals: Appeal to senses.
- How Danica McKellar did 'creative teachings' in her books?
- Applications of her methods: My experiences as a teacher and an advisor of Ph.D. students.
- Conclusions.

Why creative teaching?

- There are obstructions to attract people to Mathematics.
- Hate "Math."
- "Math anxiety" hurts people's feelings.

- IY-generations: Live with wind like willows.
- Short attention, distracted easily.

How can we change the obstructions?

- Hate "Math"→Have "Fun" and show benefits. We cannot force people to learn.
- "Math anxiety"→Provide a lot of tips and create secure feelings within people.
- <u>Appeal to senses</u> within people. Connect abstract concepts with five senses including the sense of beauty. (IY-generations are sensitive.)

How Danica did it in her books?

- Making a bracelet: The factors of integers→Use the sense of beauty
- Pandas' diet teaches you the order of operations   "PE-MD-AS"
- Integers = Mintegers→Use the sense of taste
- Readers' testimony→Connect with your future
- Horoscopes→Knowing your learning styles

We could separate the 8 jade beads into
2 groups of 4 beads each.
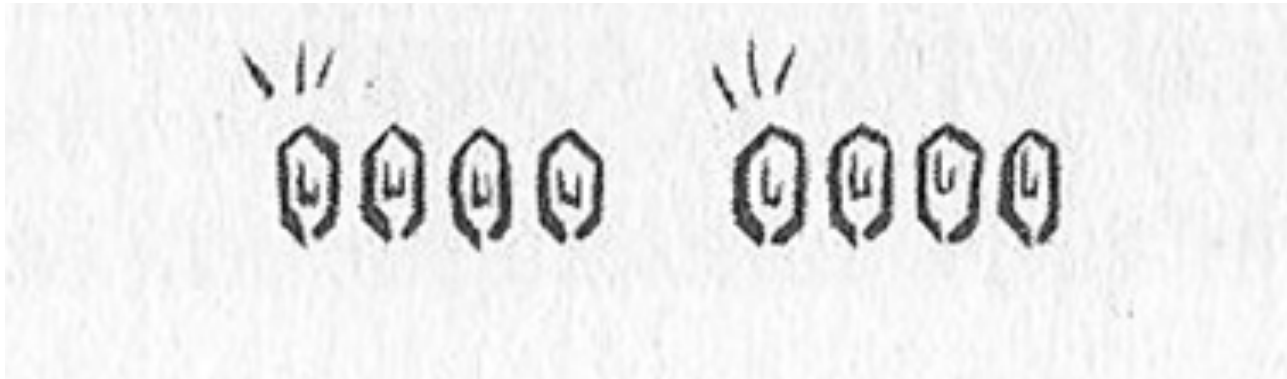
4 groups of 2beads each and so on.

4 groups of 2 beads each,
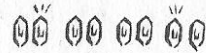
or 8 groups of 1 bead each.

For the 16 onyx beads, we could separate them into
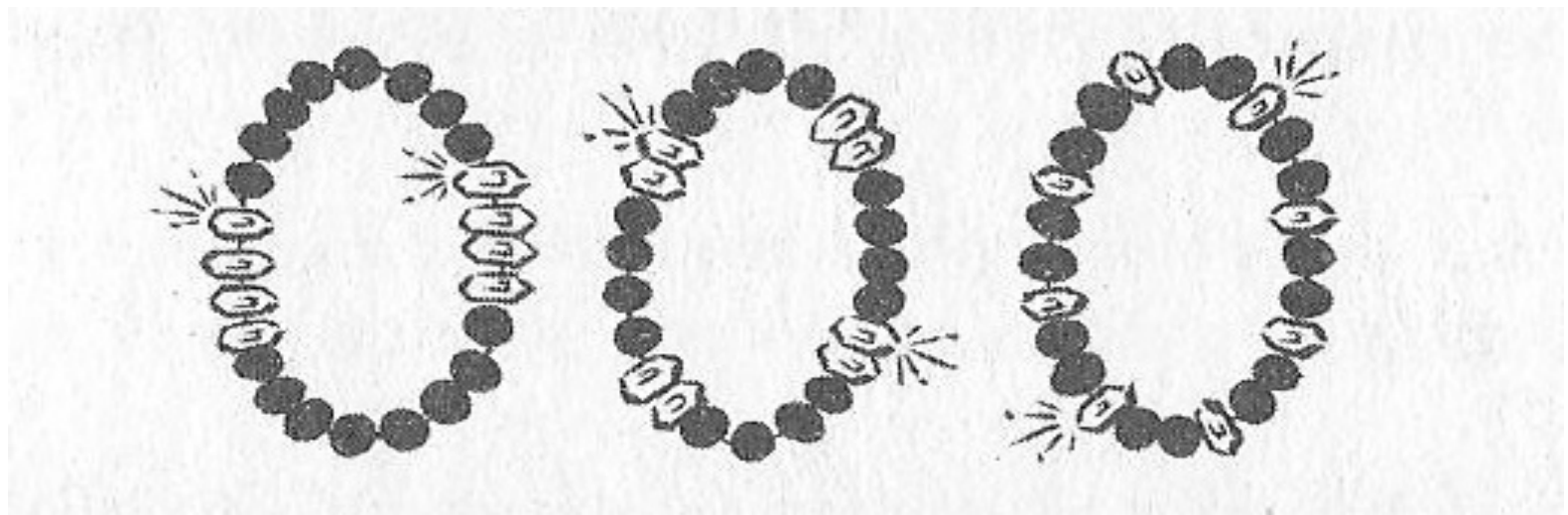
2 groups of 8 beads each,

4 groups of 4 beads each,

8 groups of 2 beads each,

or 16 groups of 1 bead each.

We can use the sense of beauty to connect with the concept of factors.

Order of Operations
Sensitive Pun

Ring R. **What's It Called?**

Order of Operations

The *Order of Operations*, often called PEMDAS, is the order in which we must always simplify a math expression:

Parentheses

Exponents

Multiplication & Division—whichever one comes first
(Notice that we could have said "Division and Multiplication"; they have the same priority.)

Addition & Subtraction—whichever one comes first
(Notice that we could have said "Subtraction and Addition"; they have the same priority.)
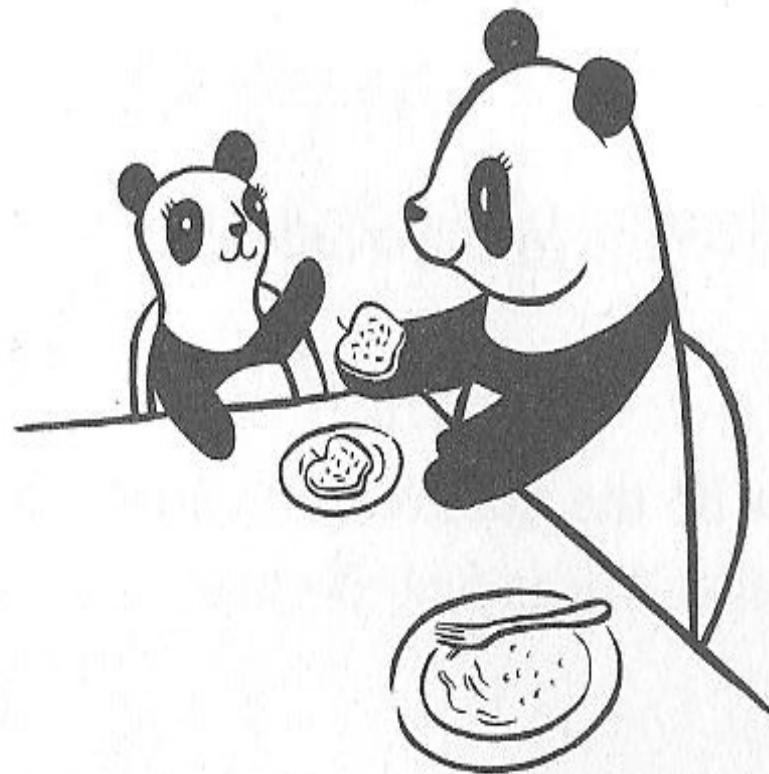
PEMDAS
Sensitive (meaningful) pun

Pandas
Eat
Mustard on
Dumplings and
Apples with
Spice

More on Danica's examples

- Appeal to your own necessity: Why do we need <u>mixed fractions</u> and <u>improper fractions</u>?

- Because we need <u>pumps</u> for a formal occasion and <u>sneakers</u> for everywhere. We do not say 5/2 sandwiches, but <u>two and a half</u> sandwiches.

- When you multiply or add fractions, you need <u>improper fractions</u>, which are more convenient.

Summarize frequently

QUICK NOTE! Sometimes the GCF of two numbers will be 1. (In other words, the biggest number that divides into both is 1.) When this is the case, they are then called **relatively prime**. Take 10 and 9, for example. Because the biggest factor they share is 1, they are considered relatively prime.

Provide a shortcut

Shortcut Alert!
CANCELING IN COMPLEX FRACTIONS
Try to cancel factors (a.k.a., reduce your fr
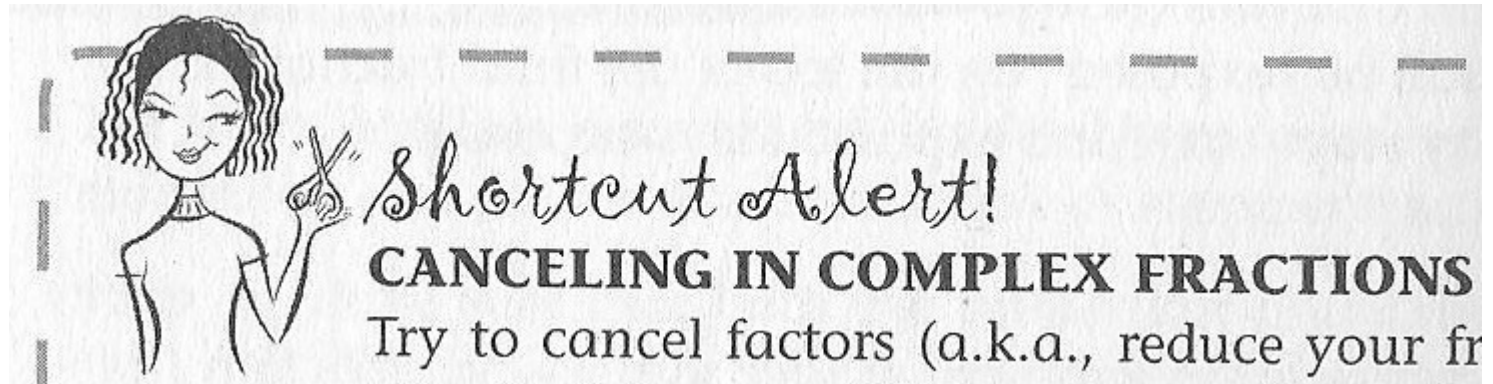
Danica's book: Step-By-Step

Step-By-Step

Finding the GCF of two numbers, using the Multiplying Monkeys met

Step 1. Write out *factor trees* for both numbers, and *circle the p* factors. (These are the monkeys swinging from the lowest branch

Step 2. Underline all the prime factors the two numbers have *in* mon. If **they** have no prime factors in common, the GCF = 1.

Step-By-Step in Action

Share your experiences

Danica's Diary

CHOCOLATE MALT MADNESS

A few months ago, I bought a big bottle of organic chocolate syrup—I was thinking about how much fun it would be to make an old-fashioned chocolate malt! I went online and found a great recipe that dates back to the 1920s.

Provide a role-model

TESTIMONIAL:

Lisa Mays (West Chester, PA)

Before: Struggling, self-critical worrier
After: Successful neuroscience major at University of Southern California!

Applications

- Use a picture for Pascal's triangle, which shades even numbers and shows a pattern.

- "Li Ate" for the order of "Integration by Parts."

- I will take a picture of each student with their name in the first class. I will try to show that I can customize the learning process since I care about each individual. Also it helps me remember their names as quickly as possible.

Applications cont'd

- In class I will talk about previous students to show them their near futures positively.

- I can apply the horoscope to my graduate students to help make an efficient plan for each. I reduce my stress by doing this. Before, I asked the same outcome from each student, and it was stressful.

Conclusions

- "Creative teaching" raised my student evaluation significantly.

- A graduate teaching assistant posted the horoscope from the book to her own class on Moodle.

- I became more open towards something I thought I was not good at. Such as social activities, adapting to new technology, and networking in the research community.

Self-analysis

- I could allow myself to use my senses towards teaching mathematics and other areas, because Danica showed me how to do it and convinced me how wonderful it would be for both the students and the teacher.

- Thank you, Danica.

- http://www.mathdoesntsuck.com/

Thank you!
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one more thing…

January 24, 2014
"Effective Juggling"

What do you want to ask to the panelists, ***Celia*** and ***Laurie***? They are interested in knowing your questions in advance. clewis@ or lstoff@latech.edu