Illuminate Your Classroom and Teach Conceptually Using Free Virtual Manipulatives

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TEACHERS OF MATHEMATICS

Introductions

Who am I?

Who are YOU?

Today's Topics

- How do apps and conceptual development fit together?

- What can they do for me? My students?

- What, What if's and Why?

Principles to Actions:
Ensuring Mathematical Success for All

- Specific **teaching practices**, that are essential for a high-quality mathematics education for all students

- What it will take to turn the **opportunity of the Common Core into reality in every classroom**, school, and district

Principles to Actions
ENSURING MATHEMATICAL SUCCESS FOR ALL

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Guiding Principles for School Mathematics

- **Teaching and Learning**

- **Access and Equity**

- **Curriculum**

- **Tools and Technology**

- **Assessment**

- **Professionalism**

Guiding Principles for School Mathematics

Teaching and Learning

An excellent mathematics program requires effective teaching that **engages students** in meaningful learning through **individual and collaborative experiences** that promote their ability to **make sense of mathematical ideas and reason mathematically**.

Effective Mathematics Teaching Practices

1. Establish mathematics **goals** to focus learning.
2. Implement **tasks** that promote reasoning and problem solving.
3. Use and connect mathematical **representations.**
4. Facilitate meaningful mathematical **discourse**.
5. Pose purposeful **questions**.
6. Build **procedural fluency** from conceptual understanding.
7. Support **productive struggle** in learning mathematics.
8. **Elicit and use evidence** of student thinking.

http://illuminations.nctm.org

Lessons

Activities

Brainteasers

Games

Monthly E-Newsletter

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Left Pan	Right Pan

Count Items   Reset Balance   Guess Weights   New Weights

Reset Table
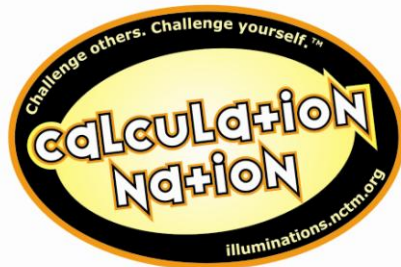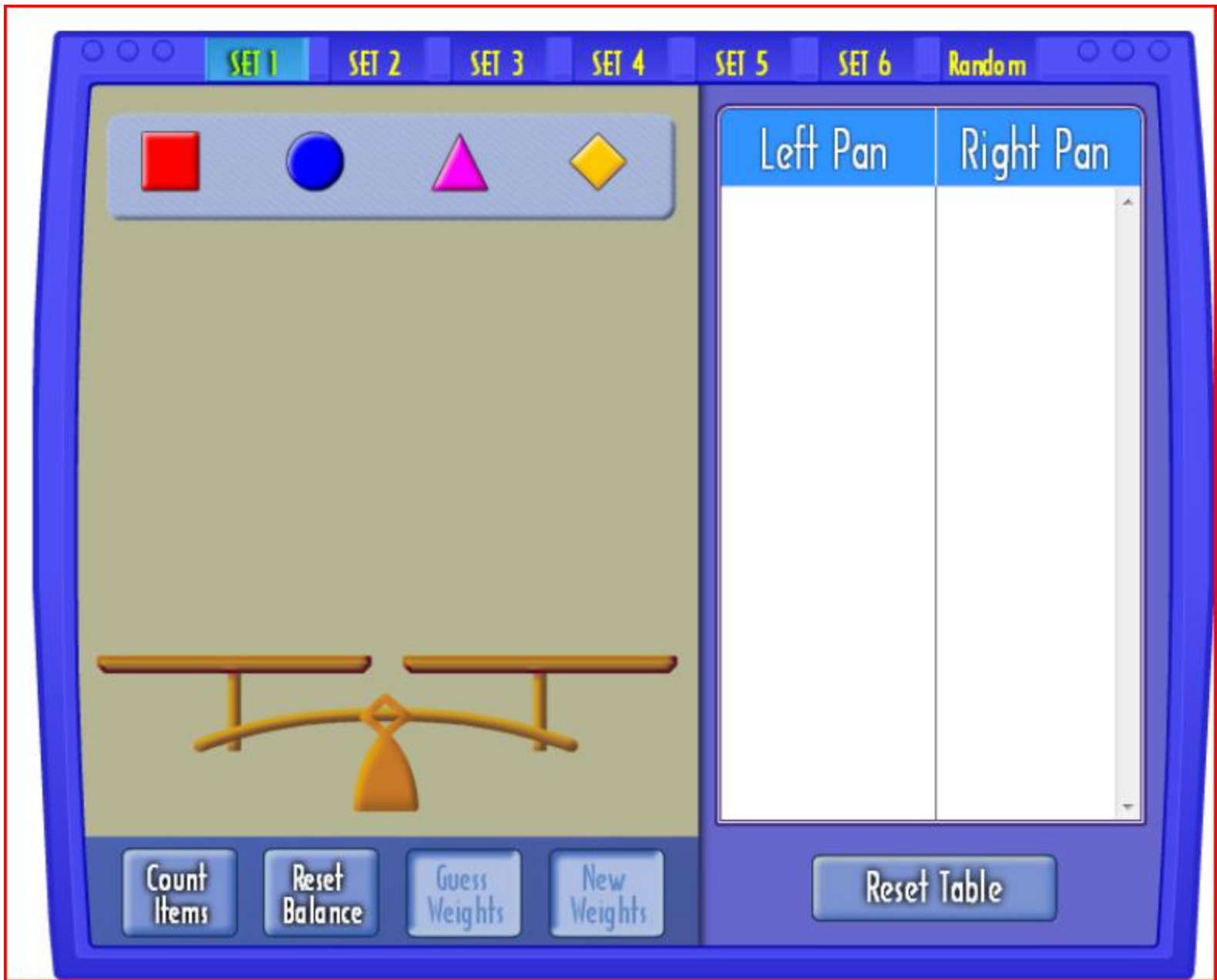
Who is a little off center?

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What Tasks/Questions Could We Ask?

What, What if.., Why

- What - What questions about the situation – What do we know? What can we figure out?

  All come with a "Why?" question.

- "What if…" what things might you be able to ask? Wonder about?

- Why? Explain your thinking.

What Tasks/Questions Could We Ask?

- Is it possible that two weights could not be balanced singly?

- If ___ weighs ___ how much would ___ weigh?

- If you put one of each on the left, how many different solutions could be used on the right to balance?

- How do the ratio of the balanced shapes compare with the weights of the shapes?

What Tasks/Questions Could We Ask?

- Create a task with 2 objects where you give show some balances and we figure out the relationship.

- Create a task with 3 objects where you give show some balances and we figure out the relationship.

What are students learning?

What are students developing?

- Concepts

- Persistence

- Problems/Tasks

- Critical Thinking

- Construct Arguments and Critique Others

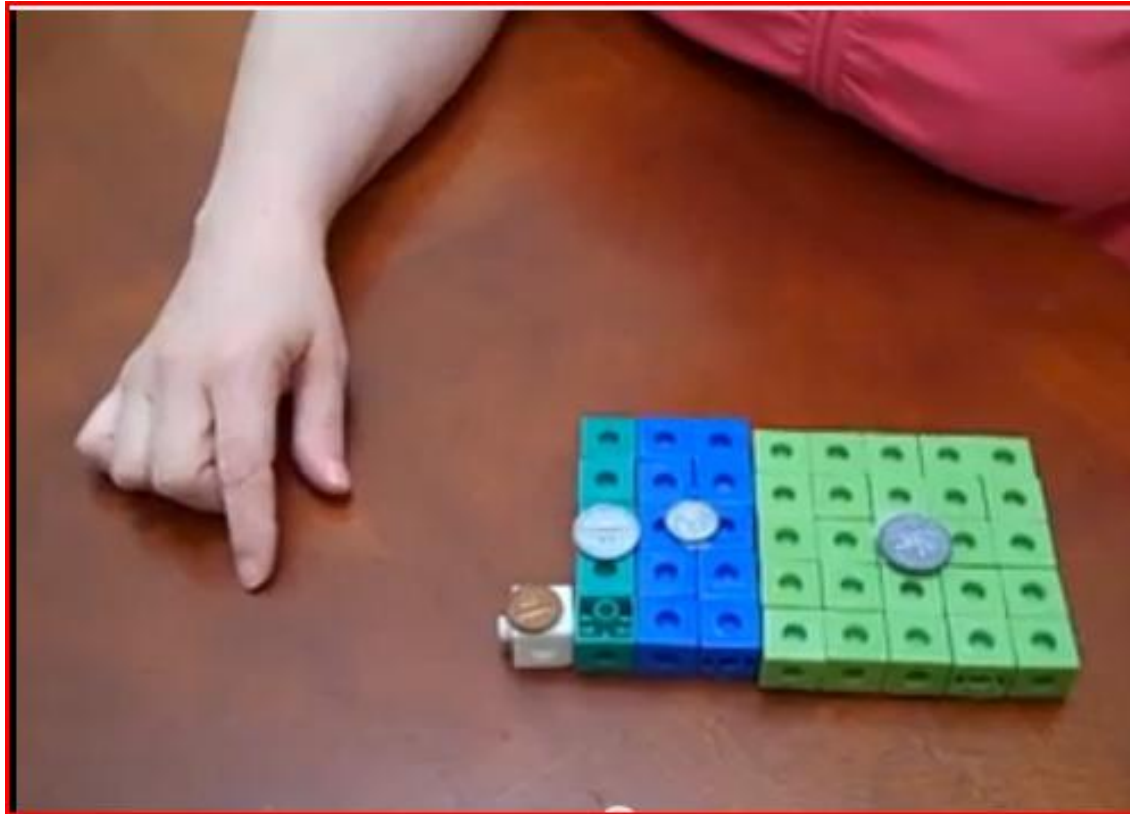- Reason – Quantitatively and Abstractly

# Coin Box

Bank

What Questions could you ask?

Questions

- What are some different ways you can break down a quarter?

- I paid for a 70¢ item with a $1 bill. What are the possible coins I could receive in change?

- I have some nickels, dimes and quarters and 8 pennies. What are possible values for the amount I could have?

How does the Coin Box help conceptual understanding?

Illuminations Video

https://www.youtube.com/watch?v=yYWNQFKleZA&list=HL1366809476&feature=mh_lolz

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http://illuminations.nctm.org/Lesson.aspx?id=3762
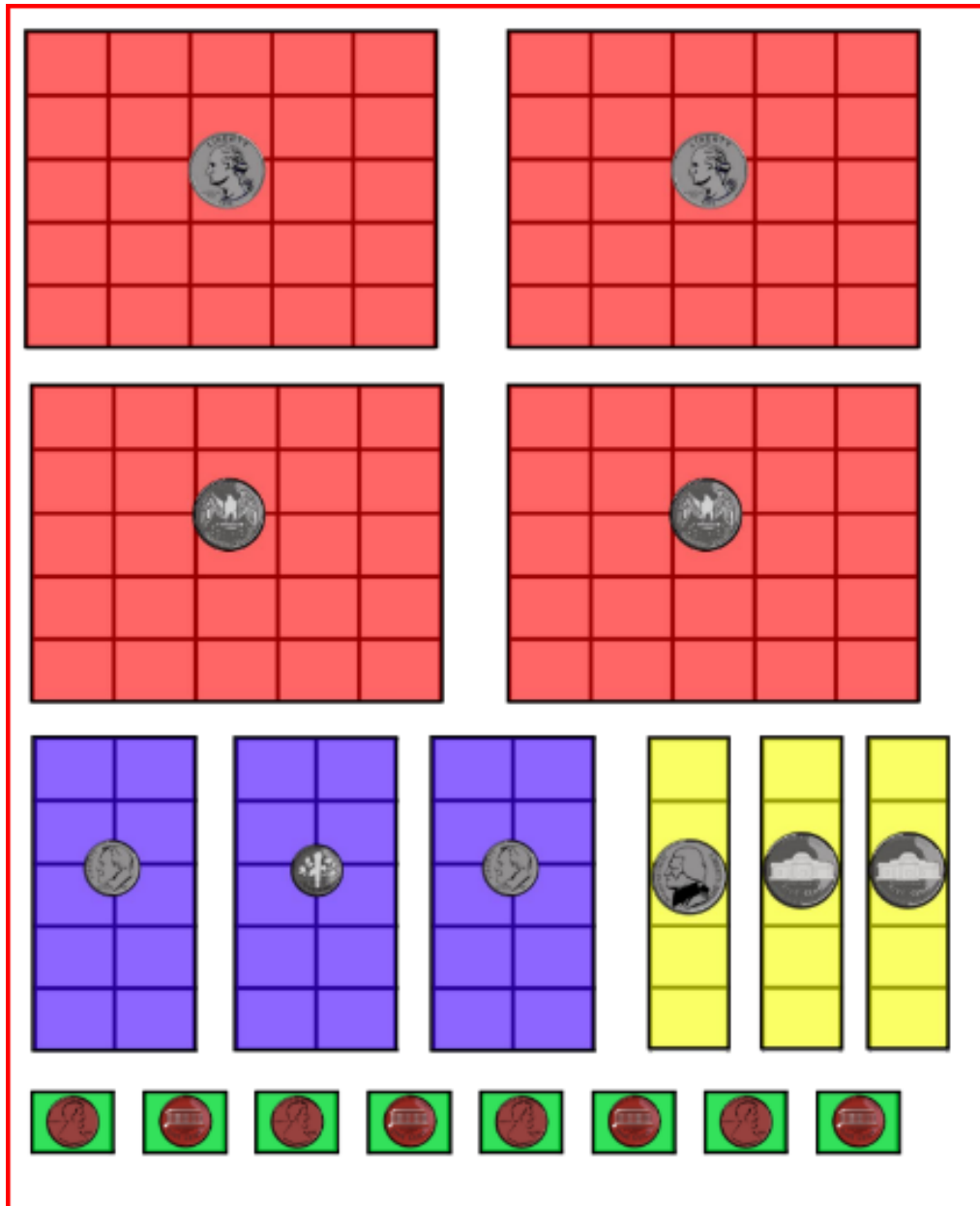
Select a shape: Cube ▼   ◉ Solid   ○ Net   Print   Reset
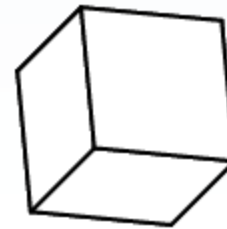
Zoom Level:

☐ Transparent

☐ Shaded

Faces (F) =
Edges (E) =
Vertices (V) =

☐ Show Total

What Questions can you ask?

What Questions can you ask?

- How does counting vertices, edges and faces work on a net work the same or different than on a 3D shape? Could you generate a rule?

- In a net which edges correspond to each other on the 3D shape?

POLYHEDRON	NAME OF EACH FACE	NUMBER OF SIDES ON EACH FACE	NUMBER OF FACES	NUMBER OF VERTICES	NUMBER OF EDGES
Tetrahedron					
Cube					
Octahedron					
Dodecahedron					
Icosahedron					
Irregular Polyhedron					

Spatial Visualization

- How does the app help?

Why Apps?

Why Apps?

- Provide a means for class discussion and problem solving.

- May be easier to manage?

- Offer experiences that may not be available without?

- Because they provide the opportunity for good tasks, good questions, good learning.

Questions? Comments ?

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