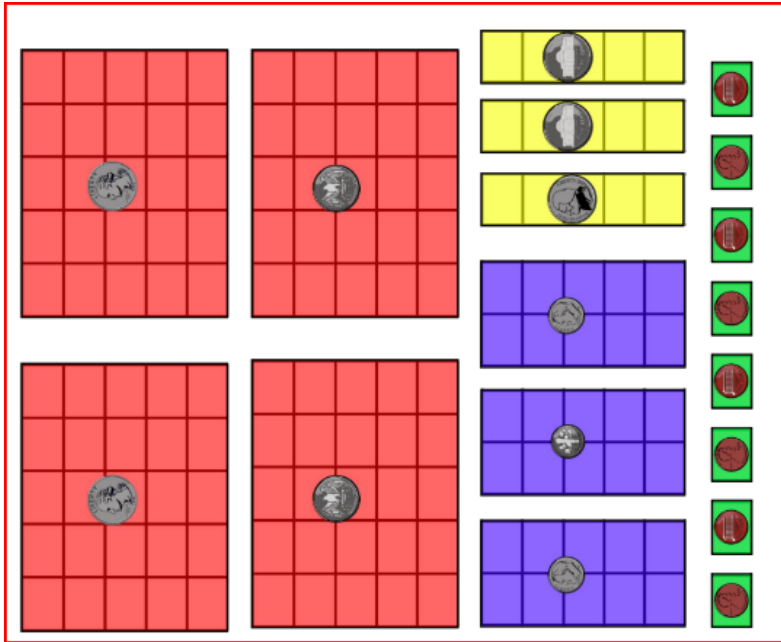





Coin Box – [illuminations.nctm.org/coinbox](http://illuminations.nctm.org/coinbox)



Geometric Solids - [illuminations.nctm.org/Activity.aspx?id=3521](http://illuminations.nctm.org/Activity.aspx?id=3521)

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					

# **Illuminate Your Classroom and Teach Conceptually Using Free Virtual Manipulatives**

**2014 NCTM Regional Conference – Indianapolis**

**David Barnes**

**October 31, 2014**



## **Introductions**

Who am I?

Who are YOU?



## Today's Topics

- Why Virtual Manipulatives?
- What can they do for me? My students?
- Creating Conjectures
- Building Math Concepts



<http://illuminations.nctm.org>

### Lessons



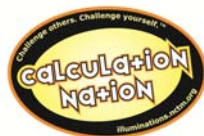
### Activities



### Brainteasers



### Games



### Monthly E-Newsletter



## Illuminations

### lessons include:

learning objectives, materials, instructional plan, activity sheets, questions for students, assessment options, extensions, teacher reflections, and standards addressed.

### Activities Include:

Interactive apps and related lessons



## calculationnation.nctm.org

### calculation nation

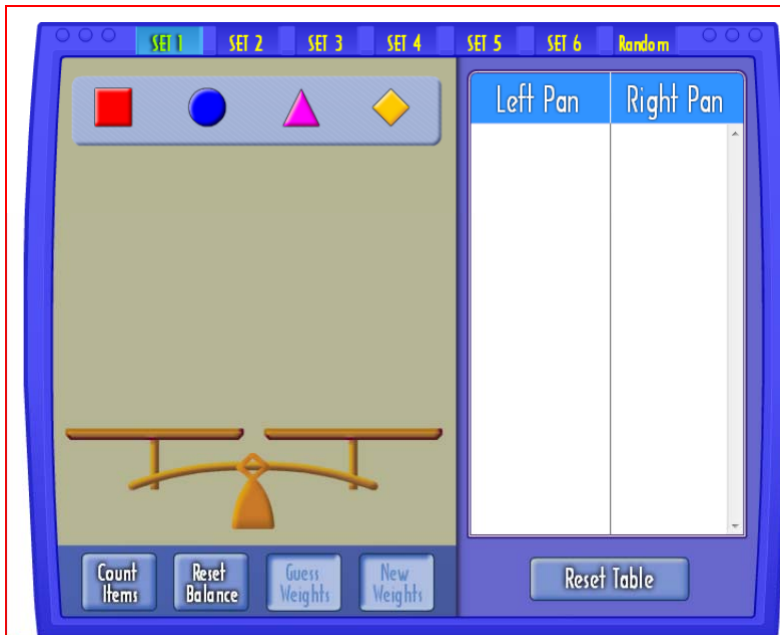
- Interactive math games
- Two players compete from any two computers
  - Ranks based on wins/losses
  - Tracks where in the world competitors live
- Includes math content and related resources
- More games and features on the way...



# Who is a little off center?



<http://himerapp.com/wp-content/uploads/2013/09/hands-raised.jpg>



## What Tasks/Questions Could We Ask?

## 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

Count  What is the value?  ¢   

Bank 



## What Questions could you ask?

## Questions

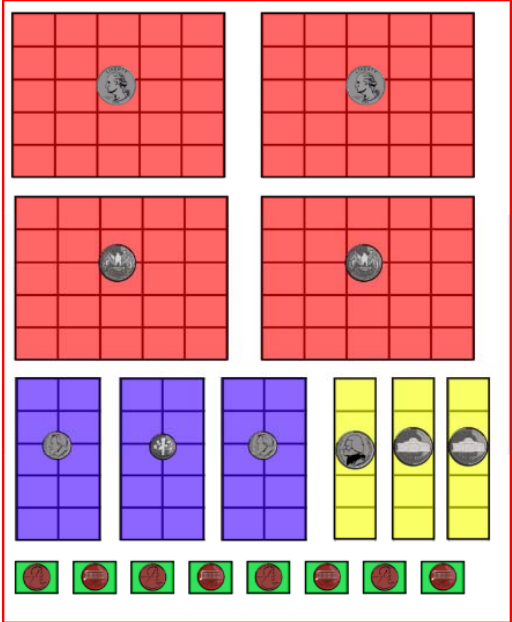
- What are some different ways you can break down a quarter?
- I paid for a 70¢ item with a \$1 bill. What are the possible coins I could receive in change?
- I have some nickels, dimes and quarters and 8 pennies. What are possible values for the amount I could have?

## How does the Coin Box help conceptual understanding?

## Illuminations Video

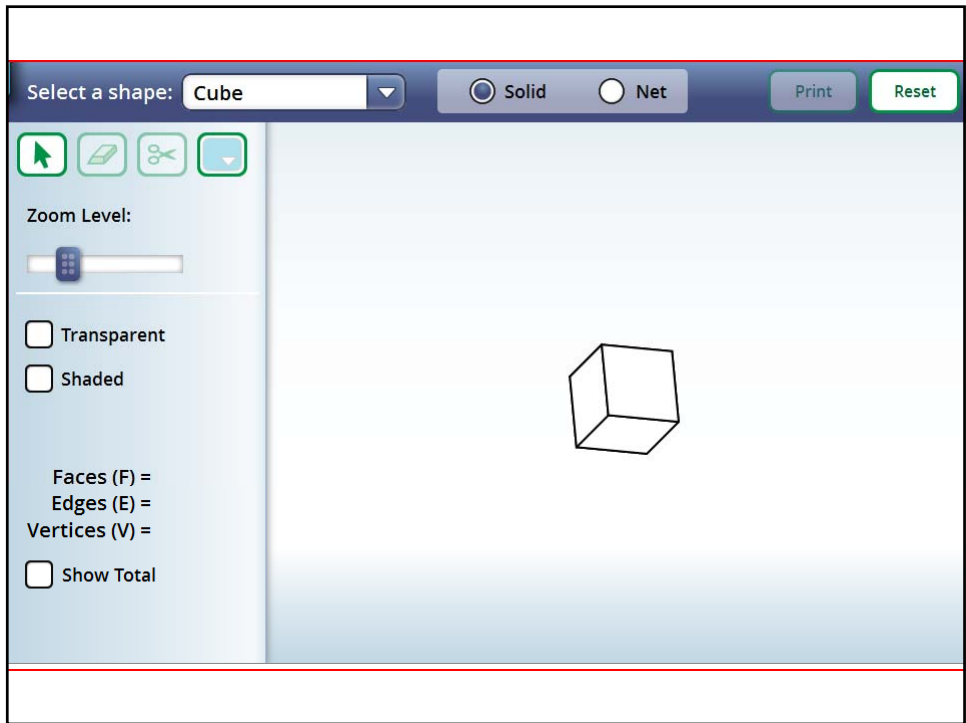


[https://www.youtube.com/watch?v=yYWNQFKleZA&list=HL1366809476&feature=mh\\_lolz](https://www.youtube.com/watch?v=yYWNQFKleZA&list=HL1366809476&feature=mh_lolz)



The image shows a net of a cube on a grid. The net consists of six squares: four red squares in a 2x2 grid, three purple squares in a horizontal row, and three yellow squares in a horizontal row. Each square contains a coin icon. Below the net is a row of eight small green squares, each containing a coin icon. The entire net is enclosed in a red rectangular border.

<http://illuminations.nctm.org/Lesson.aspx?id=3762>









The screenshot shows a software interface for creating 3D shapes. At the top, there is a dropdown menu set to "Cube", radio buttons for "Solid" (selected) and "Net", and "Print" and "Reset" buttons. On the left side, there are icons for selection, erasing, and deleting. Below these are controls for "Zoom Level" (a slider) and checkboxes for "Transparent" and "Shaded". At the bottom left, there are labels for "Faces (F) =", "Edges (E) =", and "Vertices (V) =", along with a "Show Total" checkbox. The main area displays a 3D wireframe cube.

## 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
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## Spatial Visualization

- How does the app help?

 NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

## 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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