A Task is a Task – or is it?

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Nora G. Ramirez   nora.ramirez91@gmail.com
Executive Secretary, TODOS: Mathematics for ALL
President, Arizona Association of Teachers of Mathematics

Balanced Approach to Achieving Rigor

TASKS

Conceptual Understanding

Application

Procedural Fluency
(Efficiency, Accuracy and Flexibility)

Levels of Cognitive Demands of Tasks

Research Teaching & Learning, English Learners, and Special Needs

Why connect tasks and the balanced approach?

CPA (CRA)
Concrete – Pictorial – Abstract

Principles to Action

Mathematics Teaching Practices (some) from Principles to Action

- Implement tasks that promote reasoning and problems solving.

- Use and connect mathematical representations.

- Build procedural fluency from conceptual understanding.

From Principles to Actions
Ensuring Mathematical Success for All

Levels of Cognitive Demand of Tasks

Lower Levels

- Memorization

- Procedures without connections

Higher Levels

- Procedures with connections

- Doing Mathematics

Stein, Smith, Henningsen, Silver

Problems in Context

Numerals & Equations

Recording   Recording   Connect to Situation

Concrete → Pictorial → Abstract

Words   Words   Words

Learning Mathematics

Problems in Context

A Photo Dilemma

Jaime asked Rea to make copies of the picture of his dog. When he got the copies, he said, "some of these do not look right".

Work in small groups to determine:
- Which photos "look right"?
- Why do some look right and others do not look right?
(Describe using everyday language and not mathematics to compare)

What's the Math?

- Examine the photos some more.

- How can you mathematically describe what happened to the photos for some photos to look right and some to not look right?

  OR

- How can you use numbers to compare the copied photos to the original photo? Use numbers to explain why some look okay and others do not.

Description of Proportionality

- The photos that look right are proportional to the original photo.

- Make another photo proportional to the original one that is different than the photos you have.

- What did you have to think about to make the photo proportional?

- Individually: Write words that you think are important to use when describing objects that are proportional.

- Pairs or small groups:
  - Write a description of two objects or diagrams that are proportional.
  - Draw an example of two things that are proportional and two things that are not proportional.

Additional Tasks

- Sammy has a photograph of his car that he wants to enlarge. The photo has a width of 5" and a length of 7". Choose a tool or a diagram to work the problem. Determine the dimensions of 2 different enlarged copies of the photo that would "look right".

- Latisha used the copying machine to reduce the size of a 12" x 16" map. The dimension of the shortest side of the new map measured 9". What was the length of the longest side? Defend your answer.
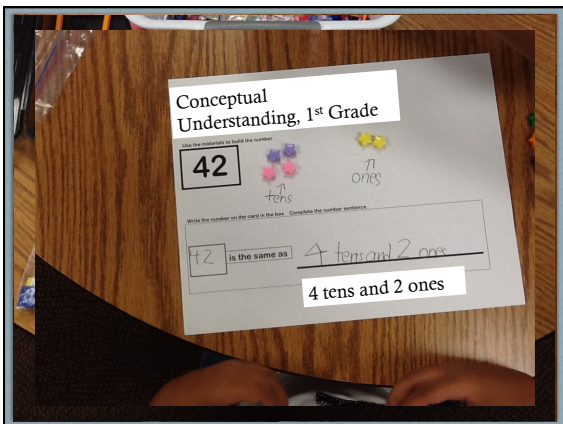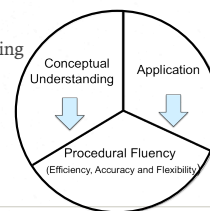
Procedural Fluency

Solve Mentally

$$\frac{2}{5} = \frac{8}{?} \qquad \frac{3}{2} = \frac{?}{3}$$

$$\frac{5}{6} = \frac{?}{9} \qquad \frac{1}{12} = \frac{?}{15}$$

Where do the pieces fit?

- Which photos look right?

- Describe why using everyday language.

- Explain using numbers.

- Define proportions. Draw something proportional to something else.

- Solve some word problems.

- Solve proportions abstractly.

Conceptual Understanding | Application | Procedural Fluency (Efficiency, Accuracy and Flexibility)

Conceptual Understanding, 1st Grade

42

tens | ones

+2 is the same as 4 tens and 2 ones

4 tens and 2 ones

Application

- Seema used ten frames to count her dice. She said, "I have 3 left over. I have 4 frames filled." Write the number of dice she has. Now write that number a different way?

- Zoe had some 5 pencil boxes. Each box had 10 pencils. How many pencils did she have in all?

Procedural fluency

- How many tens are there in 83?

- 37 = ____ tens and ____ ones

- Raise the cognitive demand.

  How would you explain to someone else how you know that you have __ tens and __ ones?