Developing a Conceptual Understanding of Fractions

Archived Information

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No Child LEFT BEHIND

Standards

Standards are goals for learning.

A student's achievement is measured by standards. These standards are fixed criteria by which a teacher judges student attainment of these goals using different measuring tools. These measuring tools compare student performance to a mixed standard.

Standards

To establish your students' goals, start with national and state standards.

Before thinking about assessment, teachers must know clearly what they want students to know and be able to do. They must know the standards they are measuring.

Assessments

- There are many different types of assessment.
- Some teachers use formal assessments on a regular basis to guide instruction.
- Informal assessments take place continuously in the classroom.

Rubrics

- **A rubric is a scoring guide for assessing student work.**
- **The rubric describes the criteria for each performance level.**
- **Rubrics are measuring tools that are usually tailor-made by the person doing the assessing.**
- **Rubrics can be either holistic or analytic in nature.**
  - The *holistic* rubric focuses on the entire response; the assessor evaluates the work as a whole.
  - The *analytic* rubric is more like a checklist and looks at specific aspects of the response.

Some Effective Mathematics Teaching Methods

summer workshop

CONCRETE METHODS

Manipulatives

SEMI-CONCRETE METHODS

Pictorial Representations

ABSTRACT PROBLEMS

Numerical Representations

Mathematical Problems/Task/Prompts

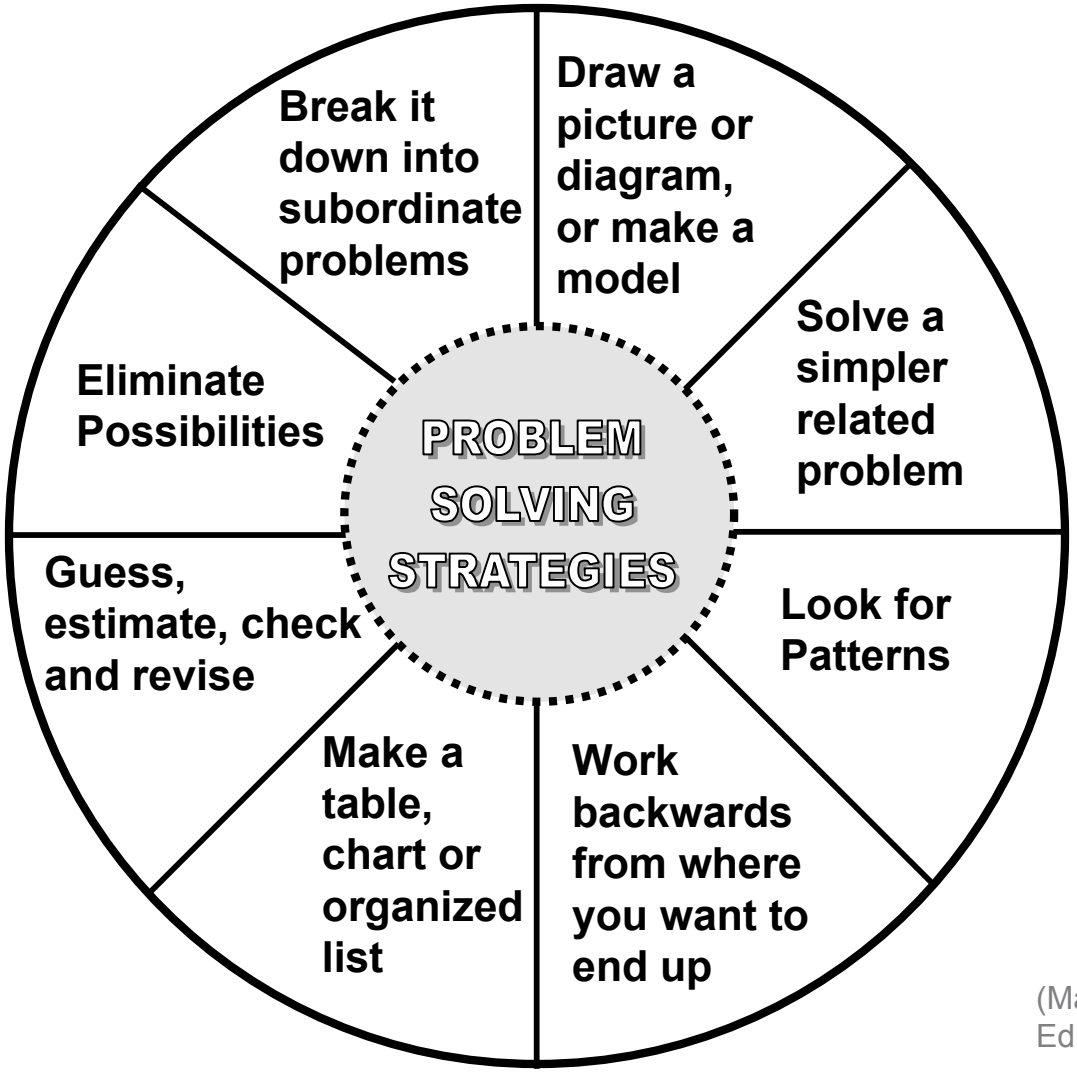
1. Solving problems in different ways is more beneficial than having students solve many problems in the same way.

2. All problems should be standards-based.

3. Problems should be enterable for all students. Students should be able to apply basic skills to get started.

4. Students need high quality problems to solve and real-world relevant contexts, because students learn by connecting new ideas to prior knowledge. Link prompts/tasks/open-response questions to real-world applications.

Problem Solving



(Mathematics and Science Education Center)

Questioning

Questions that might be asked by the teacher are:

- Can you describe exactly what you are doing?
- Why are you doing what you are doing?
- How does using this method or process help you achieve the end-result/solution? (Schoenfeld, 1987, p.206)

Questioning

Students need to be able to question themselves. Does their answer or the method they used make sense? This type of questioning from the student shifts the control of learning to the student and away from the teacher or book. (Math Forum)

Self-questioning enables students to self-assess and recognize gaps in learning and understanding. They can get to the source of their mathematical thinking.

“I don’t understand,” can be replaced with, “What do I not understand?”

Research

Researchers note that number sense develops gradually, and varies as a result of exploring numbers, visualizing them in a variety of contexts, and relating them in ways that are not limited by traditional algorithms (Howden, 1989).

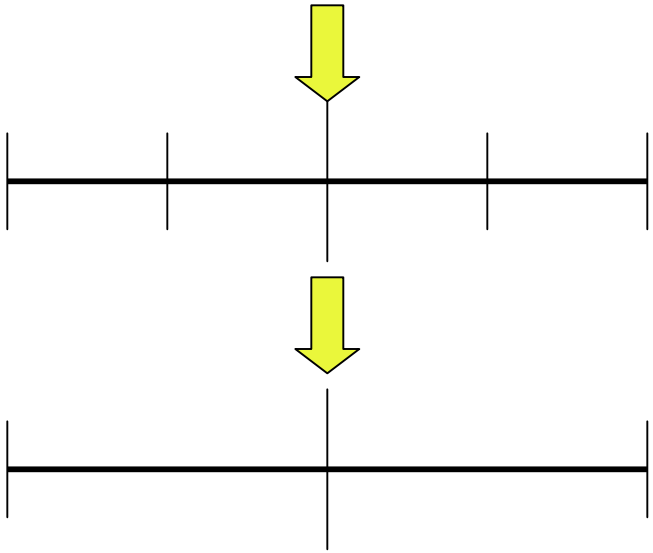
Representing fractions in a variety of ways helps students see relationships and develop understanding of later fraction concepts. It is important that students "see" a variety of concrete examples in addition to pictorial representations (Illuminations).

Manipulatives

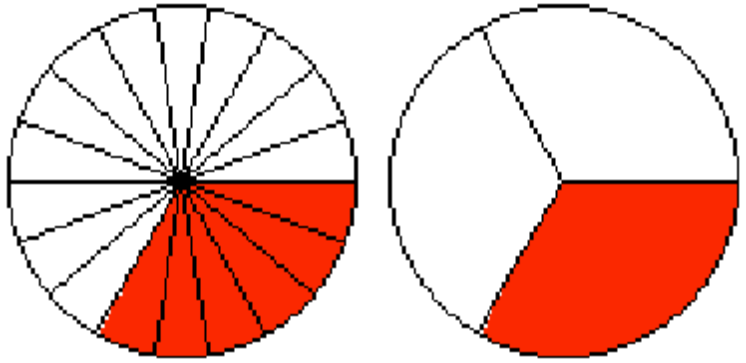
Manipulatives for teaching fractions :

1. Tangrams
2. Cuisenaire rods
3. Pattern blocks
4. Fraction strips
5. Number sticks
6. Geoboards
7. Graph paper

Renaming Fractions Using a Number Line and Parts of a Whole

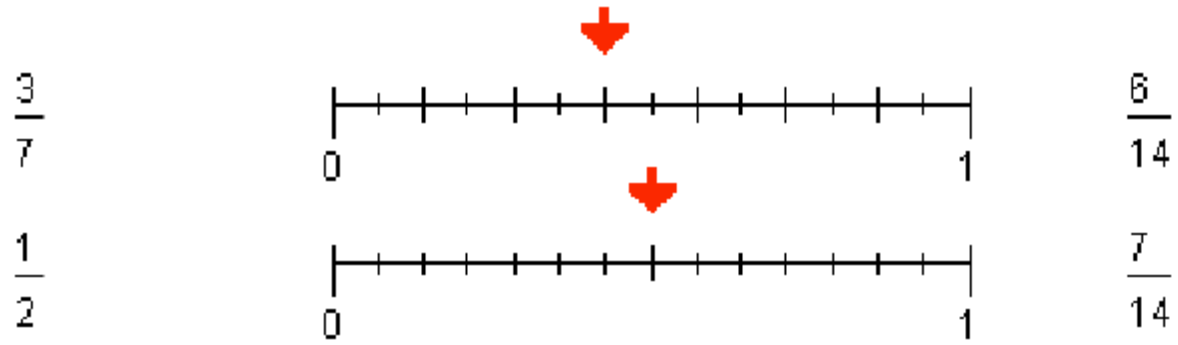


2/4 = 1/2



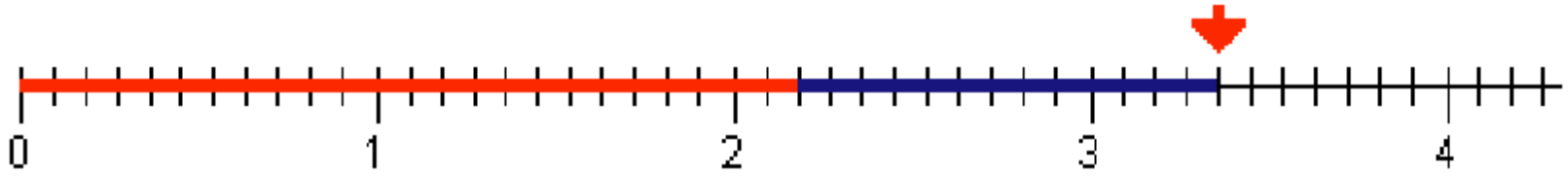
$$\frac{6}{18} \div \frac{6}{6} = \frac{1}{3}$$

Comparing Fractions Using a Number Line



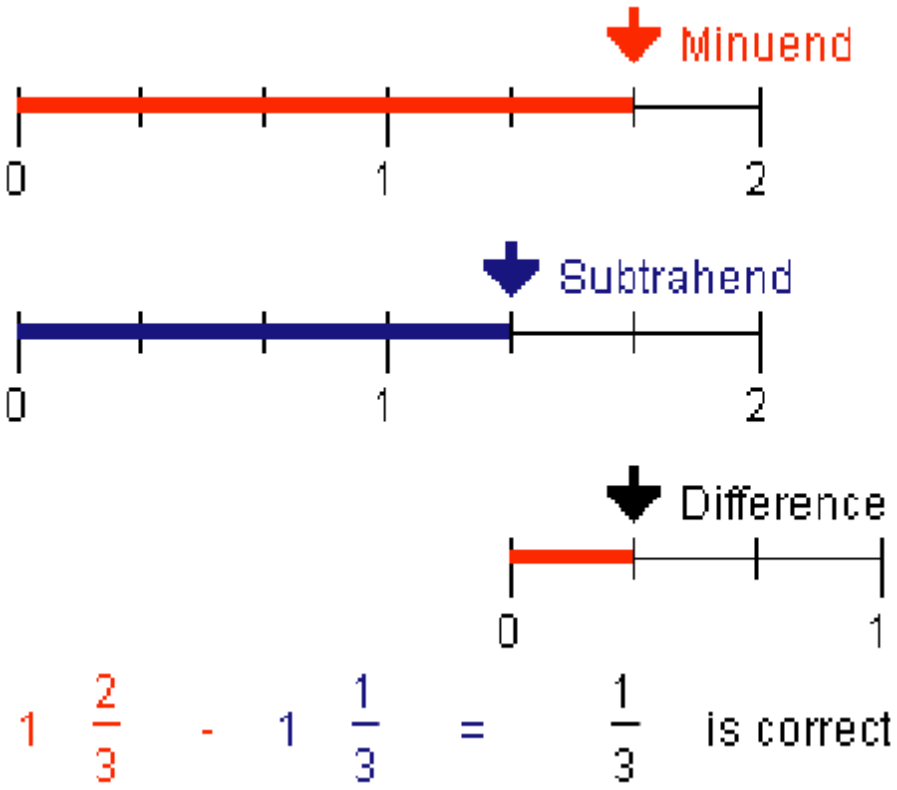
1/2 is the larger fraction.

Adding Fractions Using a Number Line



$$2\ \frac{2}{11} + 1\ \frac{2}{11} = 3\ \frac{4}{11}$$

Subtracting Fractions Using a Number Line



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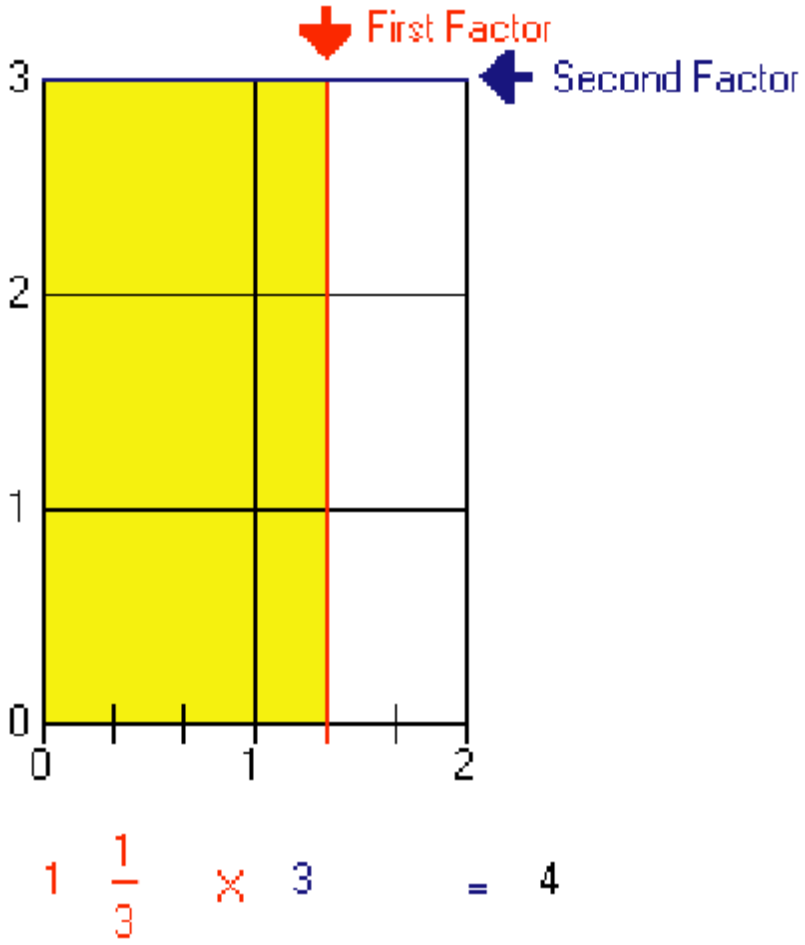
Multiplying Fractions Using a Number Line



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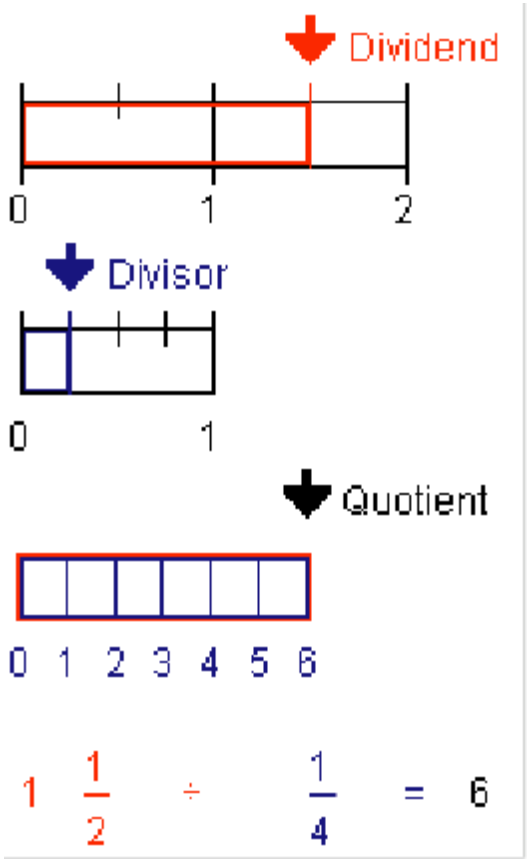
Dividing Fractions Using a Number Line



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Using Pattern Blocks to Teach Fractions

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Pattern blocks are a great way to develop fractional relationships.

Students can explore geometric models of fractions to discover relations between them.

The green **triangle** is the smallest of all the shapes.

The blue **rhombus's** size or area is exactly twice that of the triangle.

The red **trapezoid's** size is exactly three times that of the triangle.

The yellow **hexagon** is the largest of all the shapes. It's size or area is exactly six times that of the triangle.

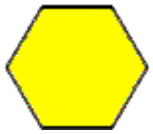
Start Out Simple

How many  are in  ?

How many  are in  ?

How many  are in  ?

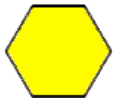
How many  are in  ?

How many  are in  ?

Cynthia Lanius's Lessons)

What is the Fraction?

If  = 1,  =_____

If  = 1,  =_____

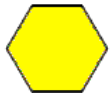
If  = 1,  =_____

If  = 1,  =_____

If  = 1,  = _____

(Cynthia Lanius's Lessons)

These are Harder!

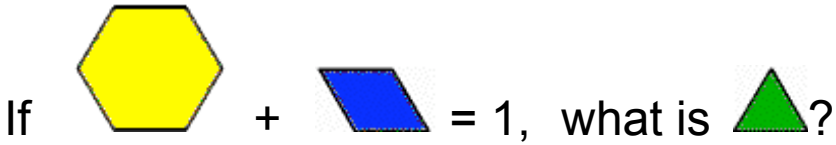
If  +  = 2/5, what is 1/5?

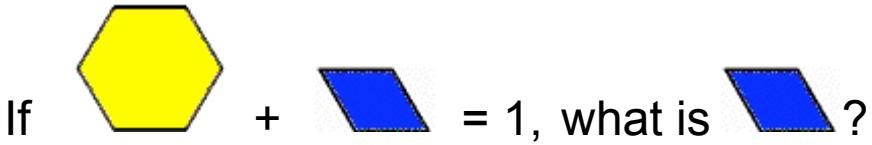
If  = 3/4, what is 1/2?

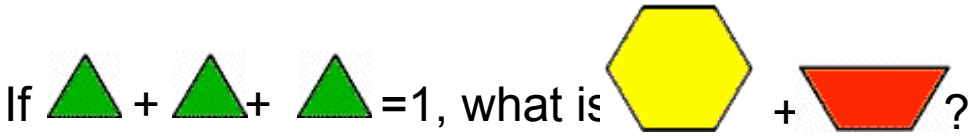
If  +  = 3/8, what is 3/4?

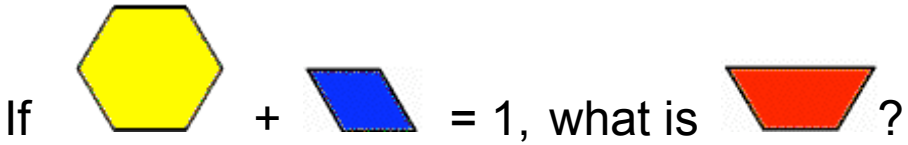
If  -  -  = 1 1/3, what is 2/3 ?

Can You Do These?

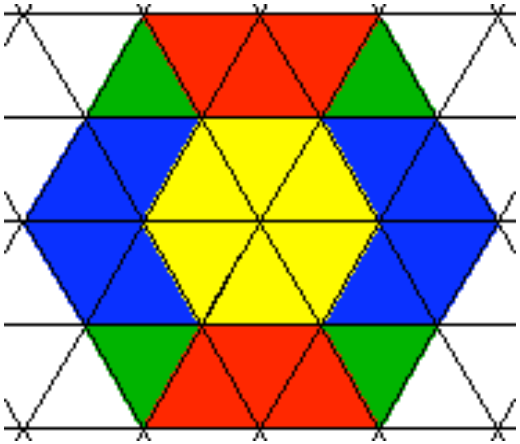








Fractions of a Design



What fraction of the design is blue?

What fraction of the design is red?

What fraction of the design is yellow?

What fraction of the design is green?

(Cynthia Lanius's Lessons)

Fall Follow-Up

The fall follow-up will include:

- **Giving feedback on classroom tested summer items/activities**
- **Acting as a resource for questions, comments, and concerns regarding fractions**
- **Acting as a resource for questions, comments, and concerns regarding the instructional use of pattern blocks**
- **Offering support and feedback on teacher-generated prompts/activities/tasks**
- **Reinforcement on standards-driven instruction.**