How can we start a class: Activating Student Thinking

Elena Heineke,

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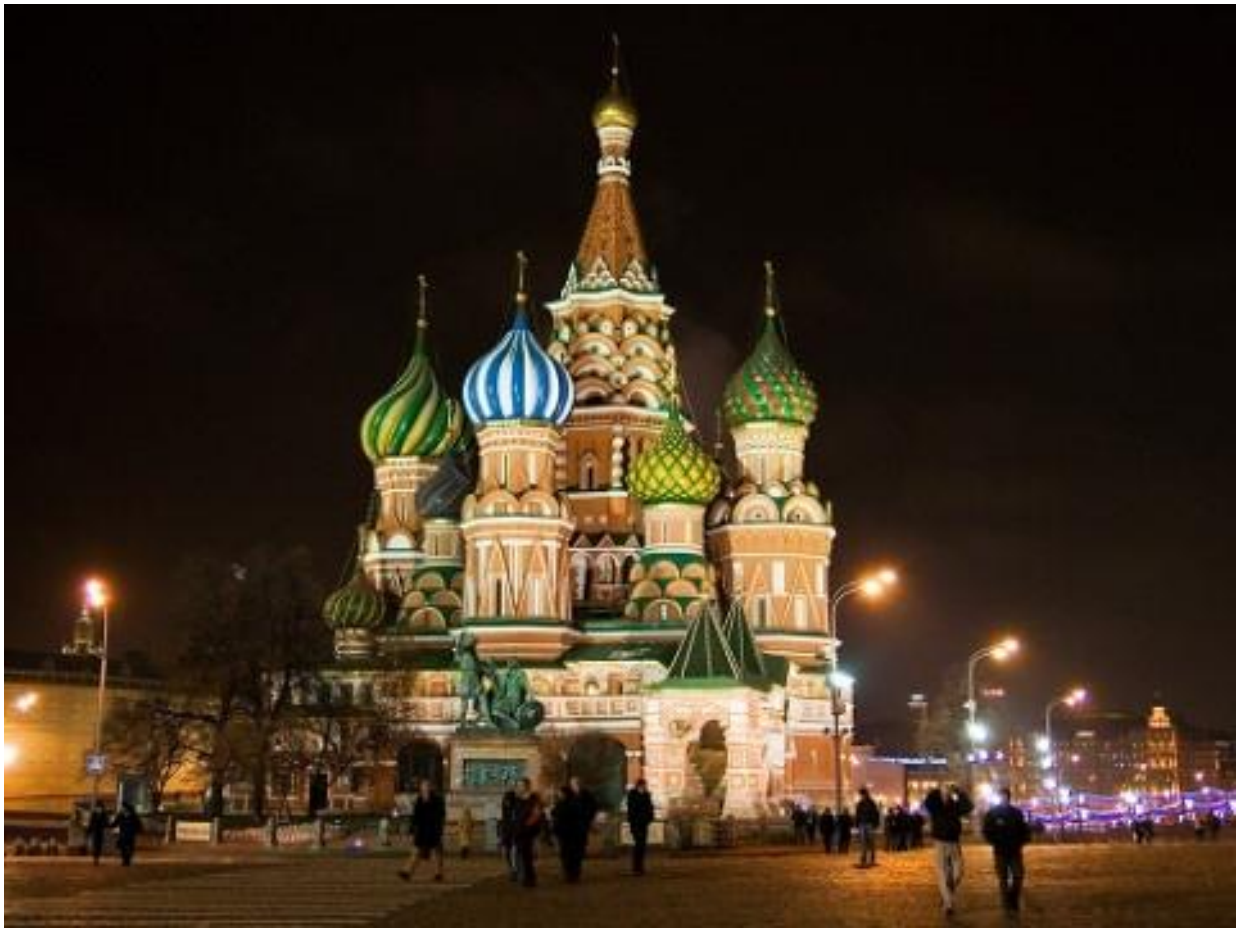
Professor Heineke originally from Russia

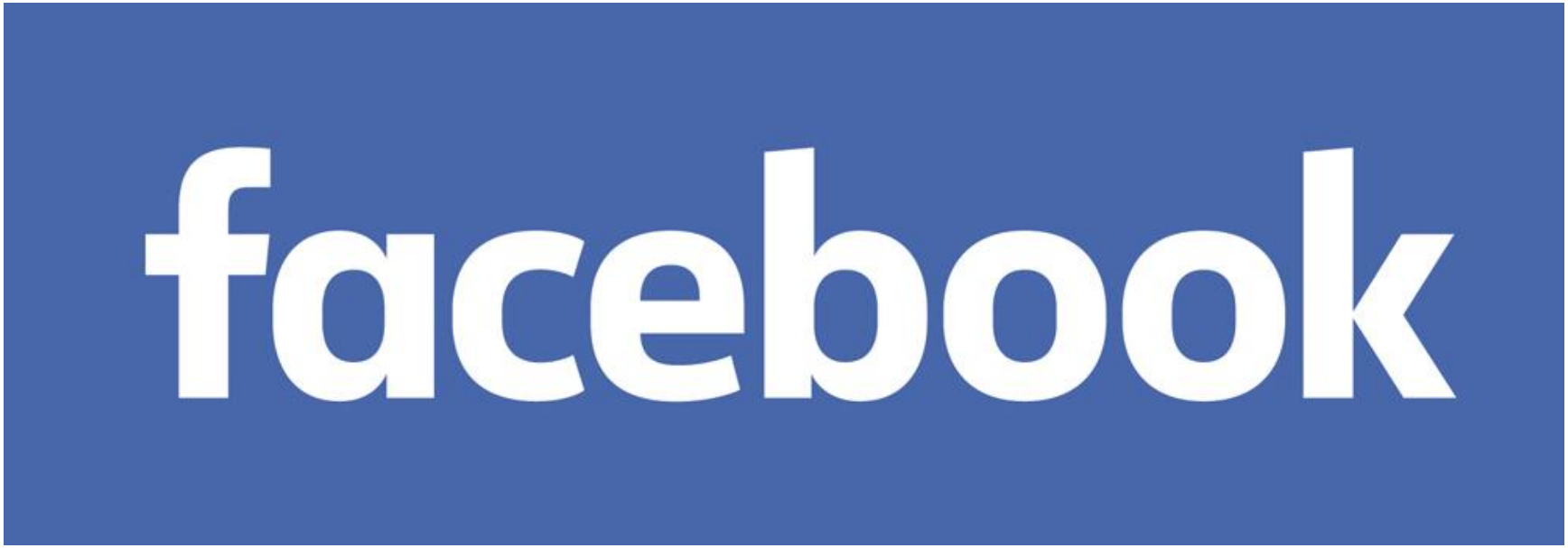


So…

- She has an accent, fill free ask her to repeat, if you have trouble understanding.

Have you checked Facebook today?

Let’s do it.



Kris McCoy's Pointless Math Fact of the Day

$9x-7i > 3(3x-7u)$ *Solve for i.*

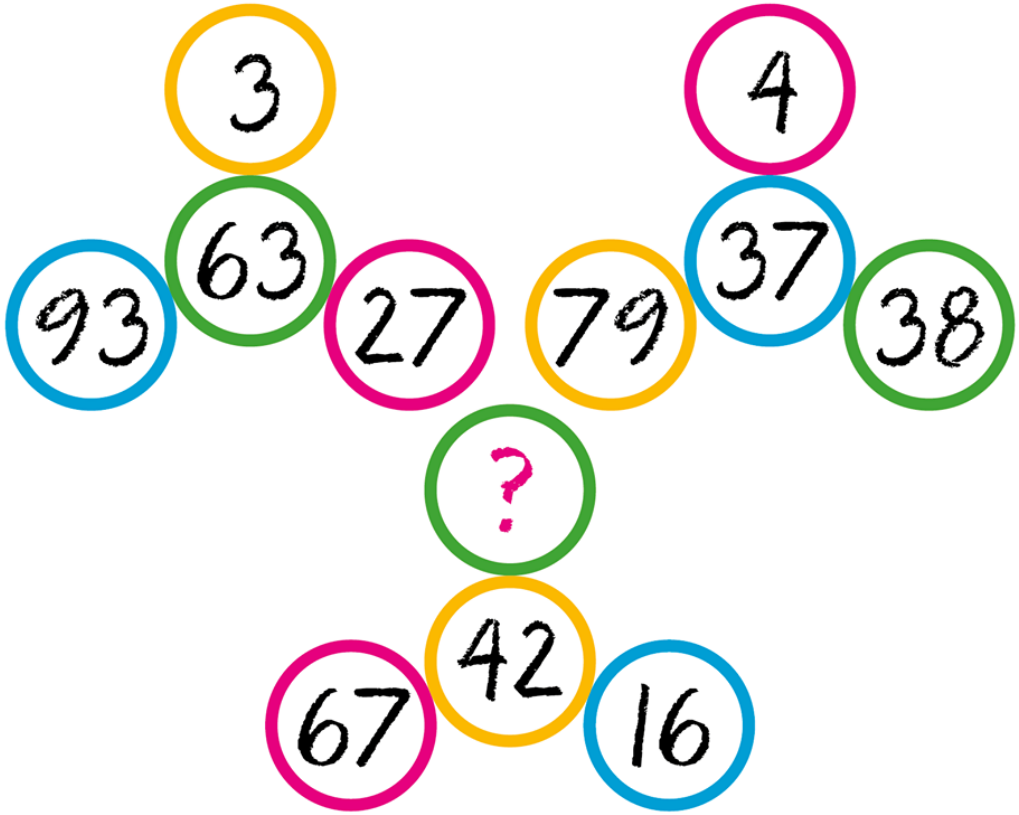
$$9x - 7i > 3(3x - 7u)$$
$$9x - 7i > 9x - 21u$$
$$9x - 7i - 9x > 9x - 21u - 9x$$
$$-7i > -21u$$
$$\frac{-7i}{-7} < \frac{-21u}{-7}$$
$$i < 3u$$

$i < 3 u$

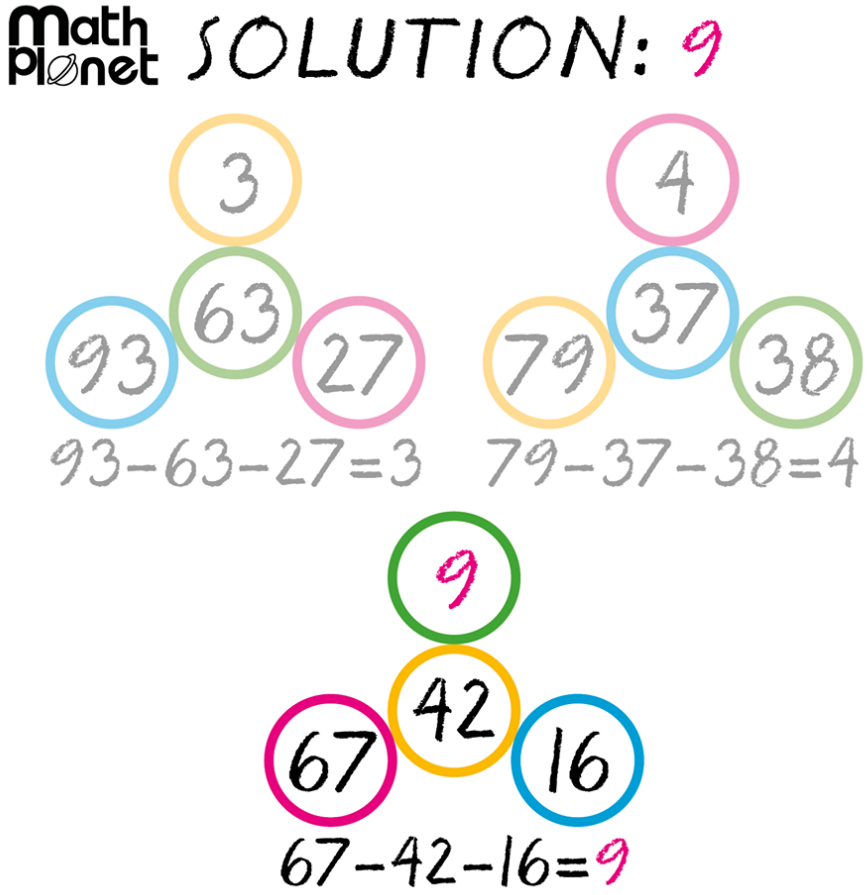
Happy Valentine's Day

from Kris McCoy's Pointless Math Fact of the Day.
facebook.com/PointlessMathFact/

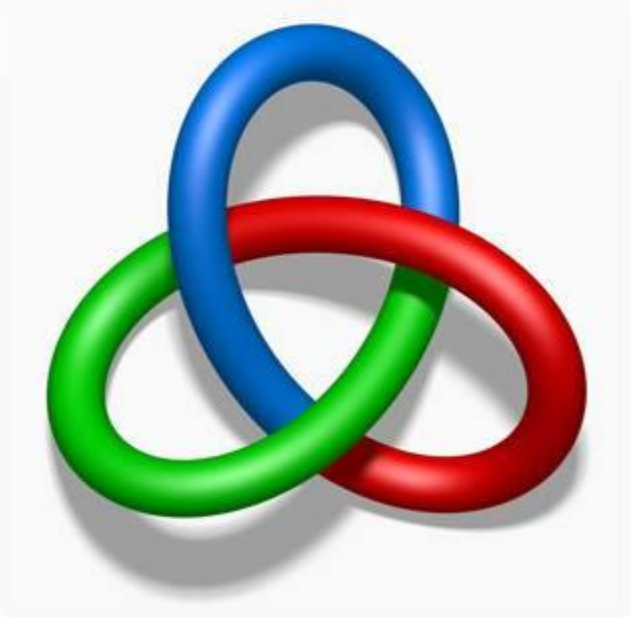
Mathplanet



Answer


Math Planet
SOLUTION: 9
3
63
93
27
93-63-27=3
4
37
79
38
79-37-38=4
9
42
67
16
67-42-16=9

Maths



- It's Pythagorean Theorem Day! You may remember, the Pythagorean Theorem is $a^2 + b^2 = c^2$. We can apply this to today's date: 8/15/17: $8^2 + 15^2 = 17^2$. When will be the next Pythagorean Day?

Answer

- The next Pythagorean Day isn't until 12/16/20!

Math Holidays You Should Celebrate

http://stemjobs.com/math-holidays/

- 1. Pi Day

  Pi Day is the quintessential math holiday. On Pi Day we celebrate pi, the constant that that tells us the ratio of a circle's circumference to its diameter. March 14 written numerically is 3/14, as in 3.14, the first three digits of pi's endless sequence of numbers.
- 2. Pythagorean Theorem Day
- 3. Sonia Kovalevsky Mathematics Day

  This day doesn't occur on any specific date and is usually just celebrated by schools. On this day we celebrate the life and career of Russian mathematician Sonia Kovalevsky to encourage young women to get involved in math.

  She was born in 1850 and was the first major female mathematician in Russia. Read more about her amazing life here.

  You can even use the holiday to celebrate other female scientists and mathematicians.

Jean Piaget

- In the 1970s and 1980s, cognitive psychologists extend Piaget's thinking into a way to approach teaching (Neisser 1976; Pearson and Anderson 1984). Since students learn by using the knowledge they already have, teachers should begin a lesson by drawing out students' prior concepts, and getting them ready to learn by asking questions and setting purposes for learning.

The ABC model
Step 1: Anticipation

In the anticipation phase, a seed is planted in rich soil.

The success of a lesson does not just depend on this “seed”, however; it must also draw on knowledge the student already possesses, just as the seed must draw on the nutrients in the soil.

Step 2: Building knowledge

With the essential ground work laid, the teacher proceeds to the knowledge building phase; the wheat seed sprouts roots and a plant grows.

Step 3: Consolidation

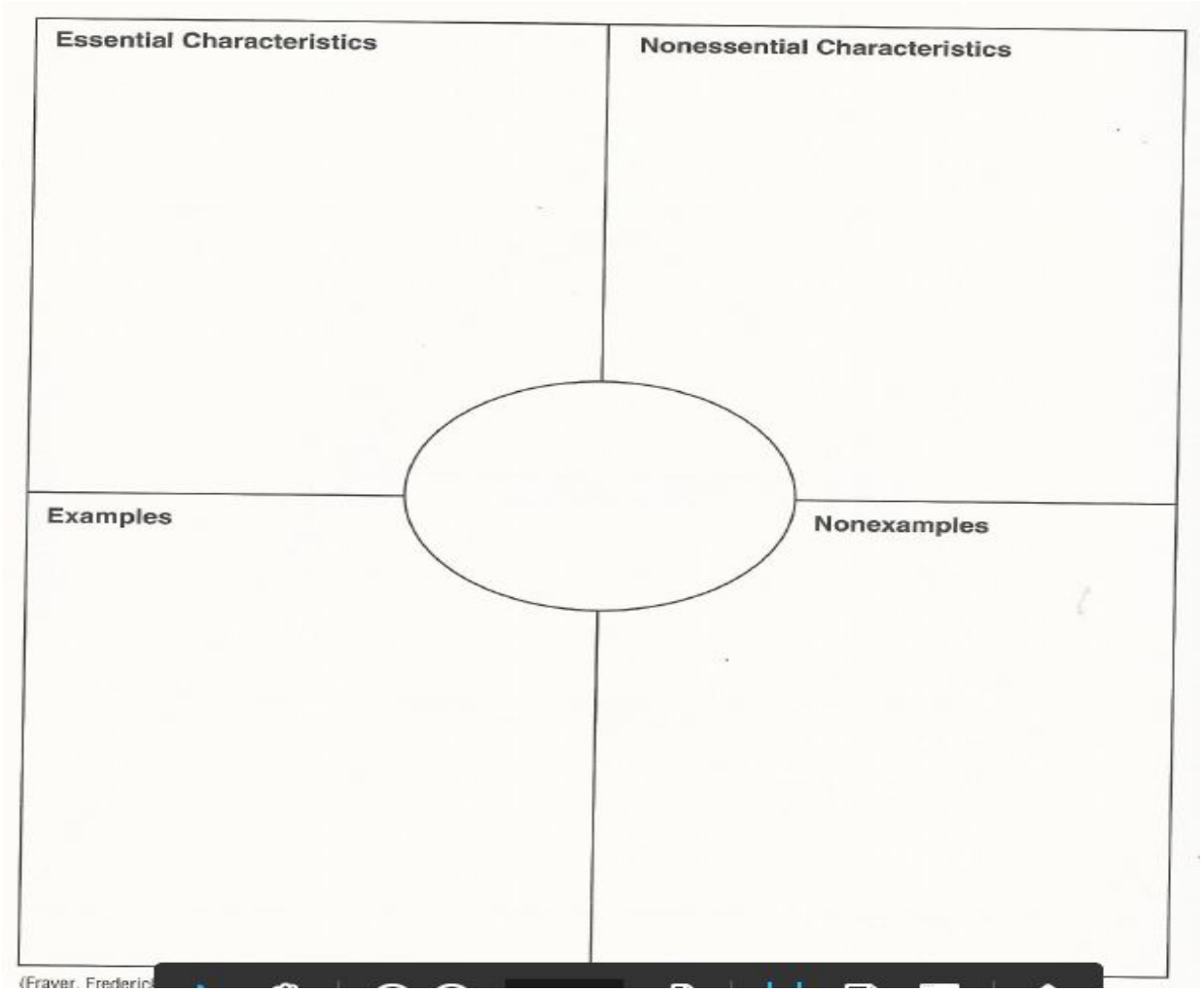
The lesson concludes with the consolidation phase. The head of wheat is mature, and contain seeds of many other plants; so too the lesson can lead into many other activities.

The beginning of the class serves to:

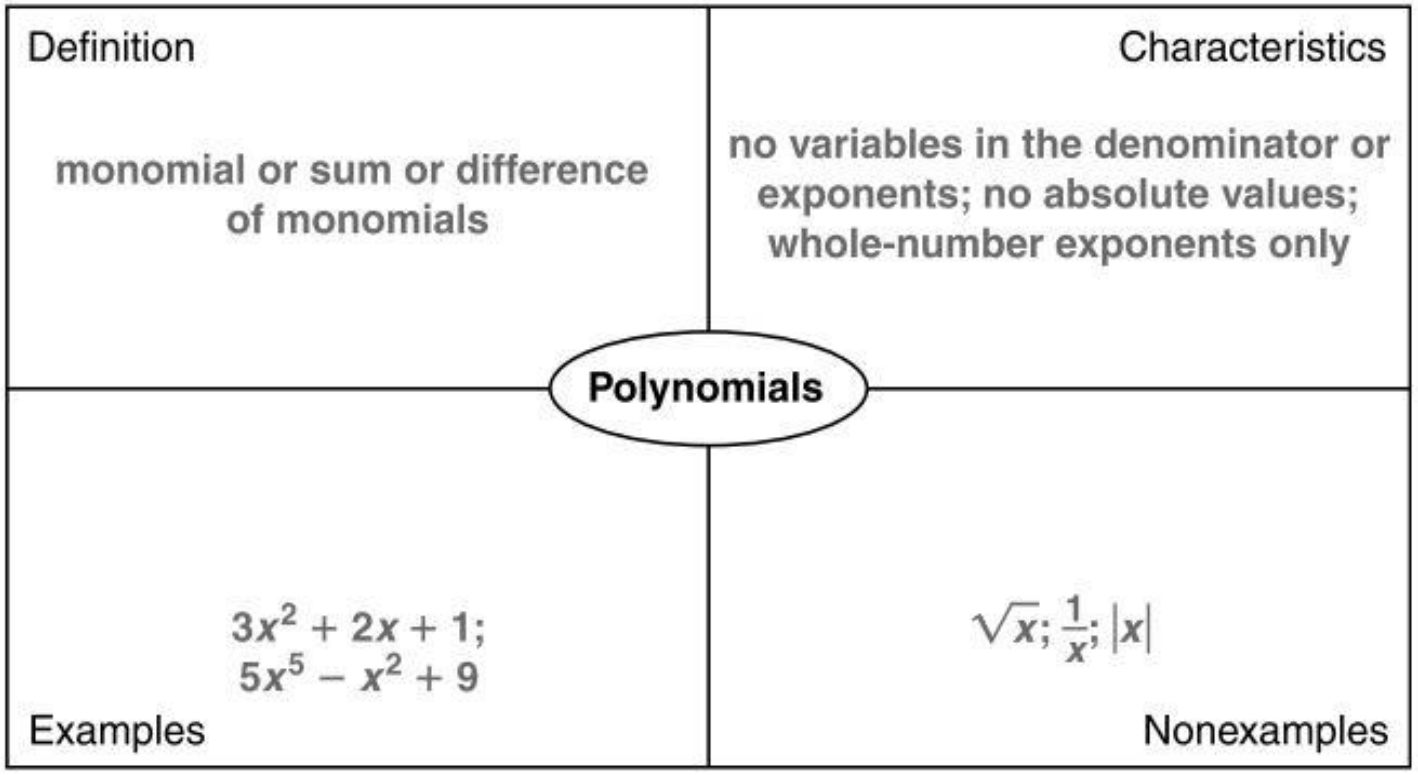
- Call up the knowledge students already have
- Set purpose for learning
- Focus attention on the topic
- Provide a context for understanding new ideas
- Informally assess what they already know, including misconceptions

Think-Pair-Share

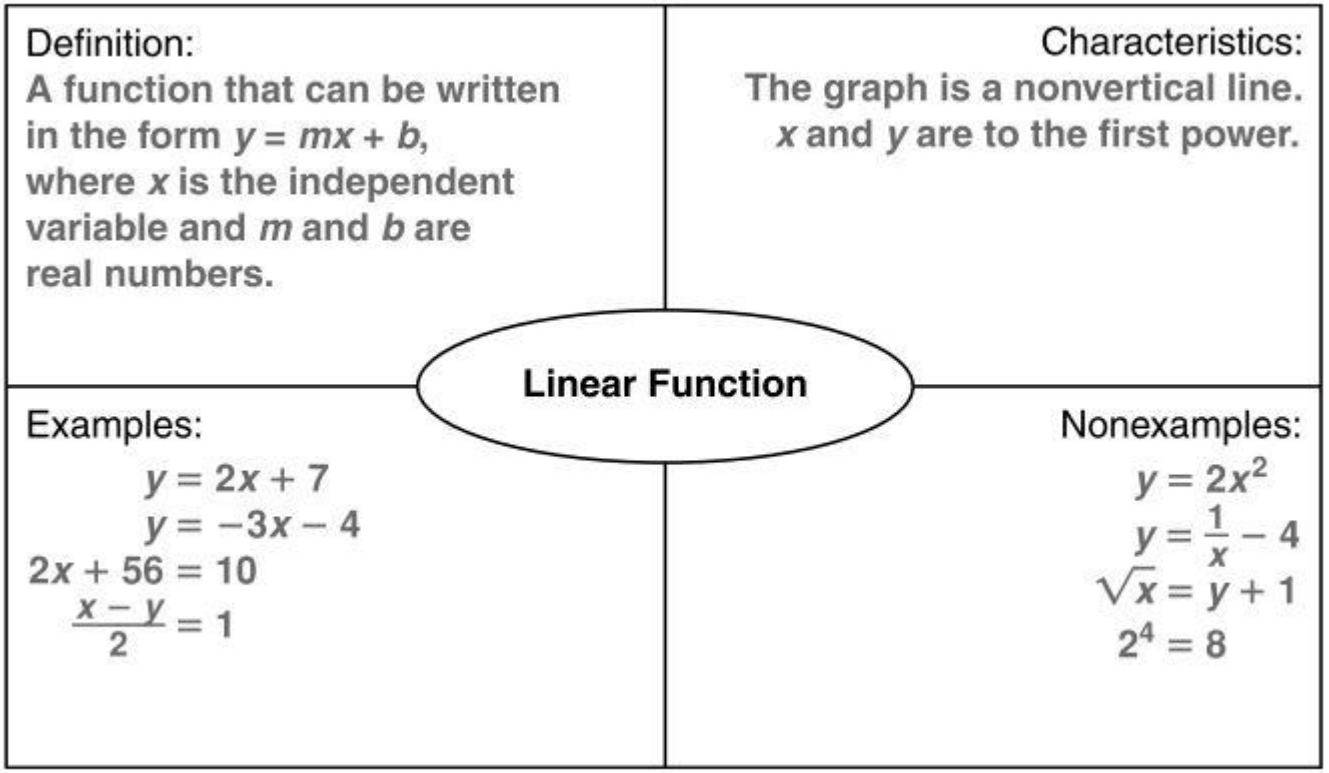
Provide students with a specific question or issue to consider, allowing them a short “wait time” to ponder their thinking individually. Then have students discuss the topic in pairs.



The Frayer Model is a graphic organizer that contains four compartments for recording information related to a concept. A blank model could be given to students. Then you can ask students to write a definition of polynomials.

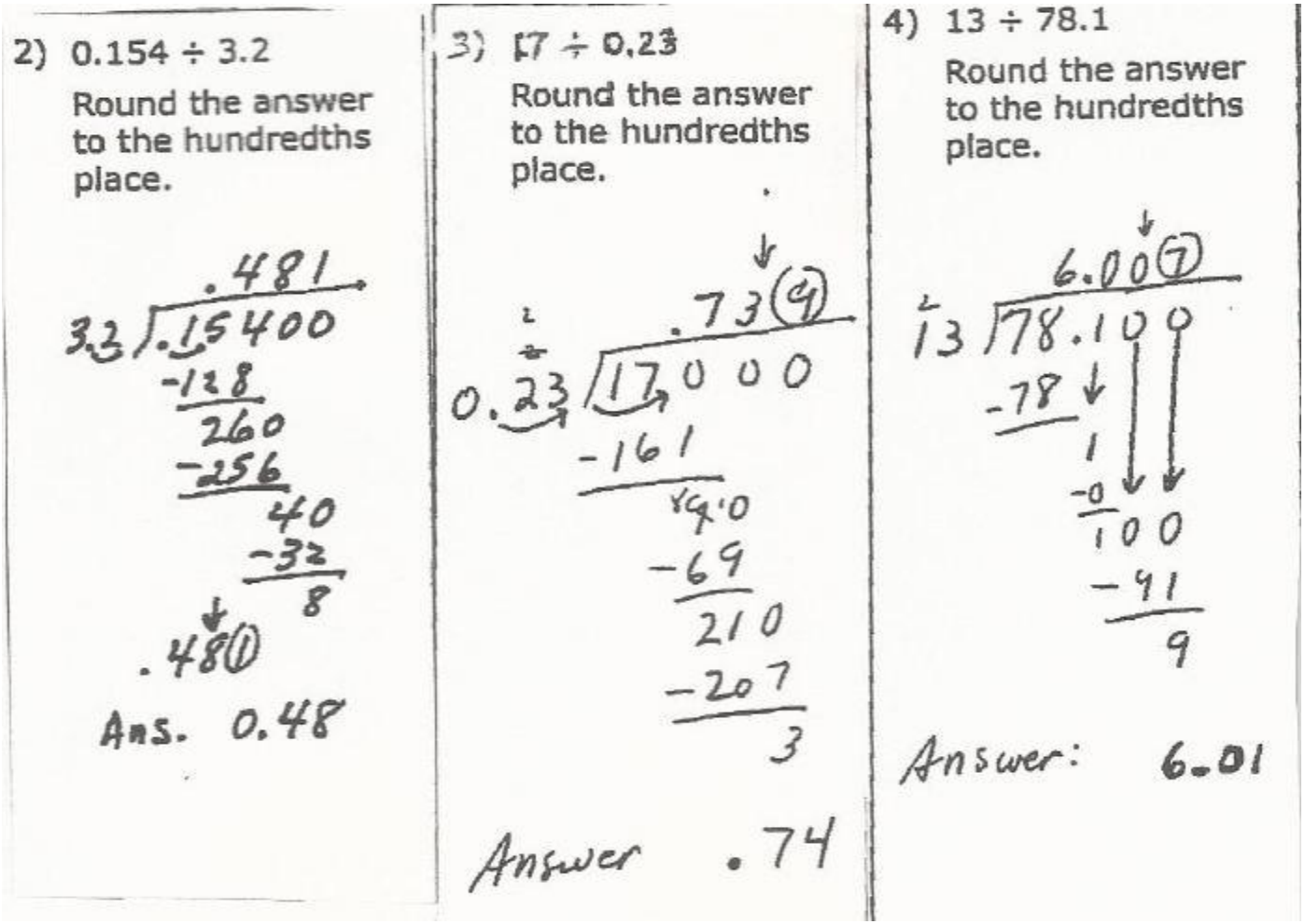


Ask students to determine the characteristic that differentiate Examples from Non-examples.



Quick- write

Identify Errors or Validate

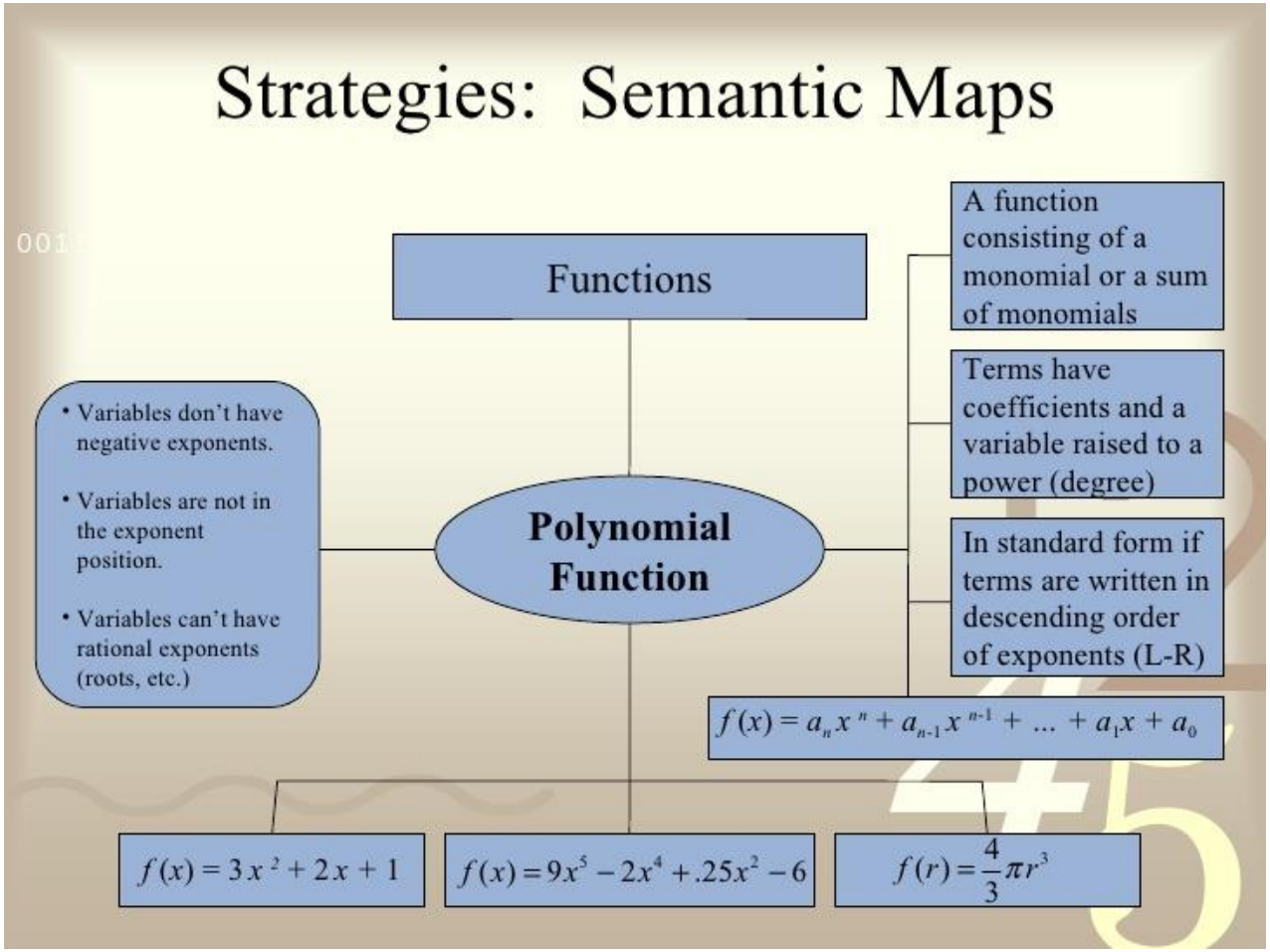


Quick- write

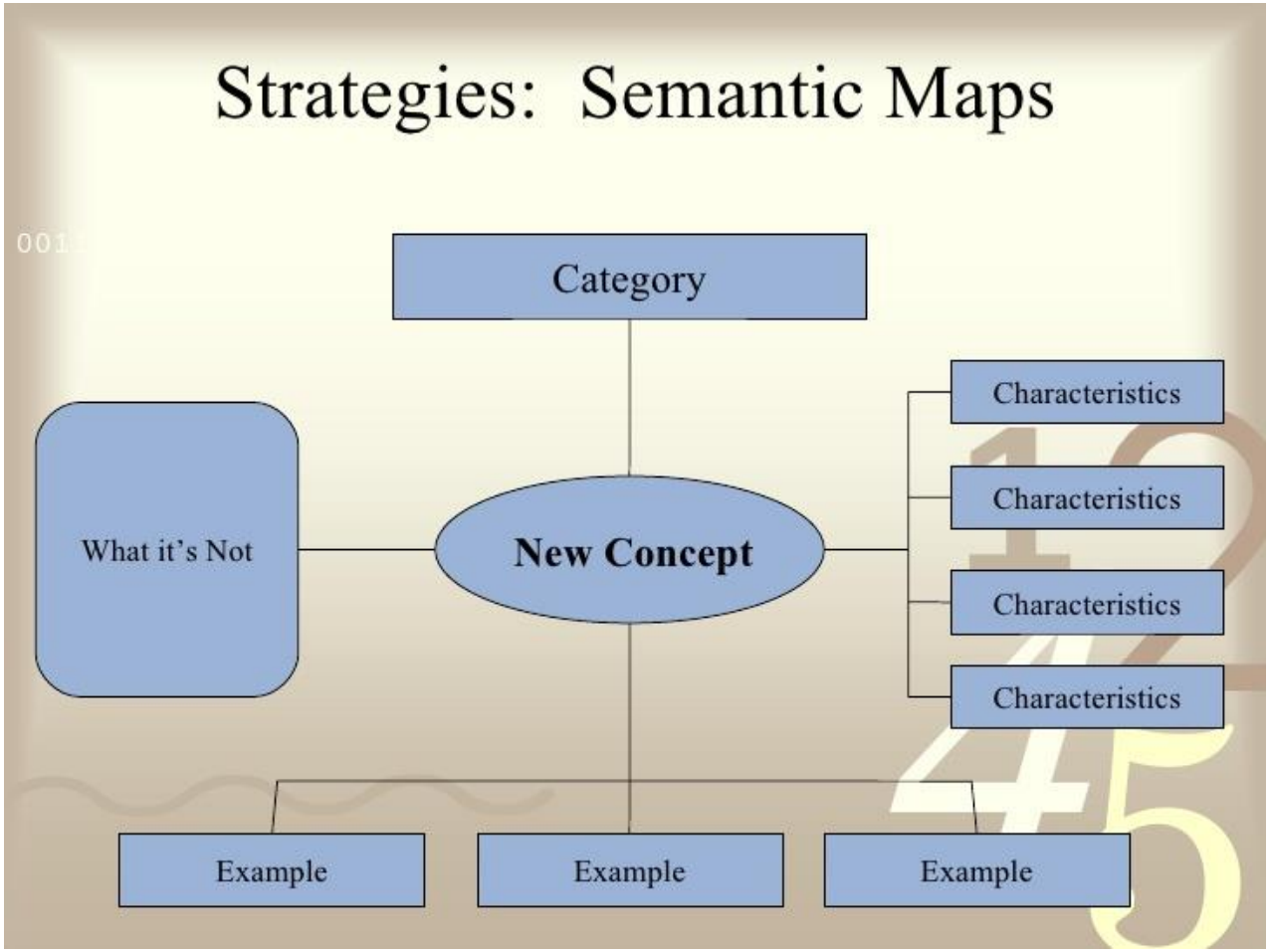
Create a model demonstrating how to divide decimals.

- Dividing by a decimal:
- Step 1
- Step 2
- Step 3
- Step 4

Semantic map

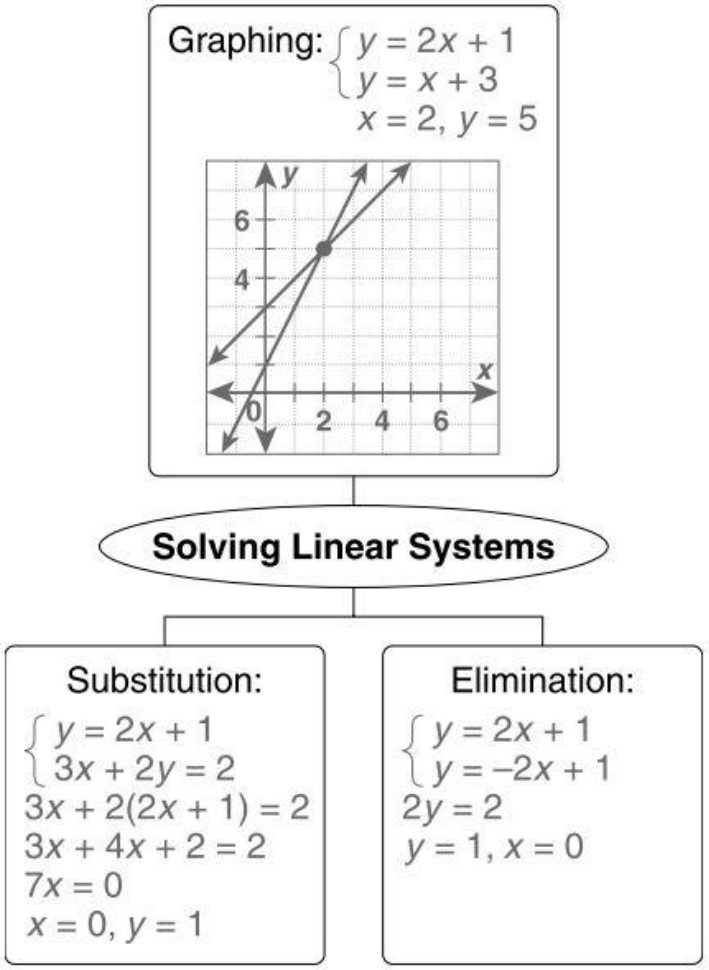


Students find that visual representations displaying major concepts and their relationships can make a journey through textbook chapters more navigable.



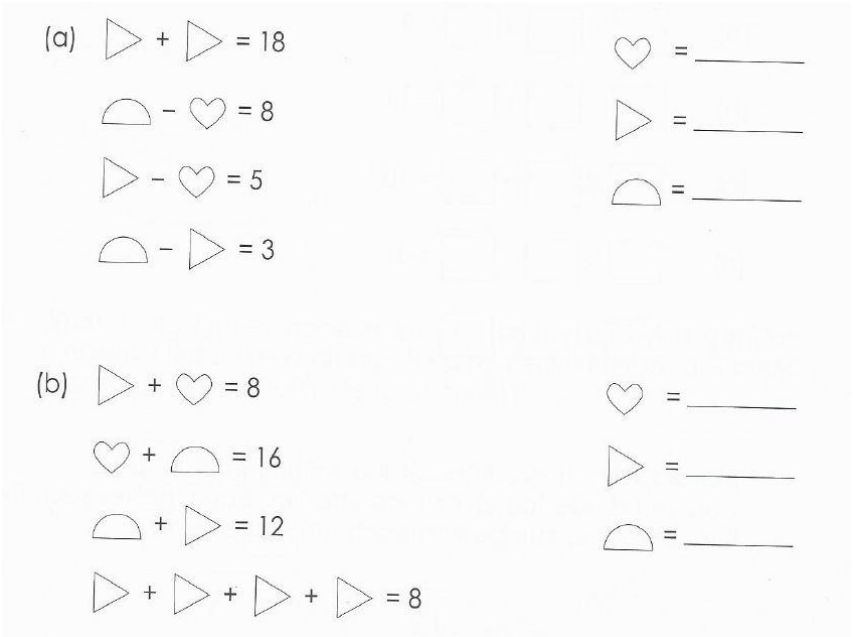
Other versions of a map.

After students have practice with Mapping, they can use the strategy in a variety of ways.

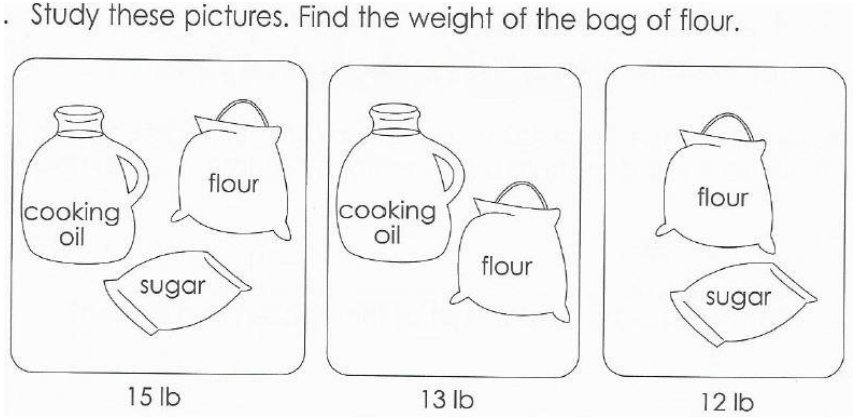


Think-Pair-Share

I n each of the following, each of the shapes stands for a certain number. What number does each shape stand for?



Solve this problem.



T-graph
Solving Equations and Inequalities

Equations

- You add or subtract the same quantity to both sides.
- You multiply or divide by the same quantity on both sides.
- The equation x = 5 has only **one solution**: the number 5. The equation $z^2 = 4$ has **two solutions**: z = 2 and z = -2. The equation x = x has infinitely many solutions: any value of x will work, since x is always equal to itself.

Inequalities

- You add or subtract the same quantity to both sides.
- You multiply or divide by the same positive number on both sides.
- When you multiply or divide by a negative number, you reverse the inequality sign.
- Inequalities usually have an infinite number of solutions.

Key terms

4-5 keywords are provided for a theme. Students are given a few minutes to think and come up with an elaboration of the terms and how they would be used in a specific context.

1. Term
2. Variable
3. Coefficient
4. Expression
5. Like Terms

Try a few problems to test your understanding.

1. How many terms are there?

$10zy + 3x - 5an + 12$

2. Which is the *variable*? $7a$

3. What is the *coefficient* of y? $5aby$

4. A binomial expression has_____ terms.

5. When the like terms in the expression

$10y + 8z + 3y$ are combined, the result will be_____

Mixed up chain login.

5-6 steps of a cause-and-effect chain are provided. Students need to arrange the steps in a logical order. Then, the students need to use their textbooks in order to confirm the correctness of the resulting statement.

Solving a system of two linear equations by the addition (or elimination) method.

Procedure:

- Substitute the numerical value you obtain for the variable into one of the original or equivalent equation.
- Arrange each equation in the form

$ax + by = c$

- Solve the resulting equation.
- Multiply one or both equations by appropriate numerical values so that when the two resulting equations are added, one variable is eliminated.
- Solve this equation to find the other variable.

Walk-around, talk- around

Students can create groups of two to six members.

Groups of two or three students are sufficient for simple tasks for which consensus should be reached quickly.

At a transitional moment in the class, have students turn to 1-3 neighbors to answer a prepared question.

This method is very flexible.

Insert the parenthesis to make each equality correct

$8 \times 4 - 3 + 1 = 9$

$8 \times 4 - 3 + 1 = 28$

$8 \times 4 - 3 + 1 = 0$

https://www.youtube.com/watch?v=URcUvFIUIhQ&app=desktop

Can You Solve This?

$$6 \div 2(1+2) =$$

Questions?