Buying Organic

Isabelle needs to purchase produce at Fred Meyer's. She knows that her family likes to buy organic produce, but she also notices that it is more expensive. How much more will Isabelle spend in the produce section if she buys all organic produce?

Produce	Regular Price	Organic Price	What Isabelle Needs
Gala Apples	$1.79 / lb.	$2.29 / lb.	3.2 lbs.
Pineapple	$3.49 each	$4.49 each	2 pineapples
Navel Oranges	$1.29 / lb.	$1.89 / lb.	2.5 lbs.
Honeycrisp Apples	$3.49 / lb.	$3.99 / lb.	5.1 lbs.
Tomatoes on the Vine	$1.99 / lb.	$2.49 / lb.	3.75 lbs.
Russet Potatoes	59¢ / lb.	89¢ / lb.	10 lbs.
Raspberries	$2.99 / pkg.	$3.99 / pkg.	2 packages
Strawberries	$3.99 / pkg.	$5.99 / pkg.	1 package

Bang for the Buck

Ella is joining the Bellingham Figure Skating Club at the Sportsplex, and she and her mom are shopping for a new pair of figure skates. They have a 20% off coupon for the skates which will lower the price, but they also know that they will be charged sales tax of 8.7%.

Ella is wondering if it is more advantageous to add the sales tax before applying the discount, or to apply the discount before adding the sales tax. Investigate, and help Ella decide which order (tax then discount *OR* discount then tax) will result in a better buy. Explain your reasoning.

Would your answer change if instead of having a 20% off coupon, Ella had a $20 off coupon? Explain your reasoning.

Sums and Differences

Examine the following equations involving sums of unit fractions.

$$\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

$$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

$$\frac{1}{5} + \frac{1}{7} = \frac{12}{35}$$

Are these sums correct? What pattern do you see?

What generalization can you make about the sums of unit fractions? How could you complete the following equation:

$$\frac{1}{m} + \frac{1}{n} =$$

Use your generalization to find the sum of $\frac{1}{9} + \frac{1}{13}$.

Investigate what happens when you change the equations above to subtraction equations: $\frac{1}{2} - \frac{1}{3}$, $\frac{1}{3} - \frac{1}{4}$, and $\frac{1}{5} - \frac{1}{7}$. Find and apply a generalization for $\frac{1}{m} - \frac{1}{n}$.

Consecutive Negatives

Take four consecutive numbers, for example, -7, -6, -5, and -4. Place + and/or – signs between them.

-7 + -6 + -5 + -4 = -22

-7 + -6 – (-5) – (-4) = -2

There are many more possibilities. Try to list all of them, and work out the solutions to the various calculations.

Choose a different set of four consecutive negative numbers and repeat the process. Take a look at both sets of solutions. Explain any similarities.

Predict some of the solutions you will get when you start with a different set of four consecutive numbers. Test out any conjectures you may have. Explain and justify your findings.

Teachers and Administrators

A group of teachers and administrators are meeting for a retreat to plan for the next school year.

- The average age of the teachers is 35.
- The average age of the administrators is 50.
- The average age of both teachers and administrators is 38.

What is the ratio of the number of teachers to the number of administrators?

Flippant Factoring

The following trinomial expressions can be factored into two binomial expressions in the form $(x \pm j)(x \pm k)$ where j and k are integers. Find all possible values missing from the expressions below.

$$x^2 + \underline{\quad}x + 12$$

$$x^2 - 8x + \underline{\quad}$$

$$x^2 - \underline{\quad}x - 10$$

Extra Challenge: Given the same criteria as explained above, find four possible values for the expression below. Generalize a pattern for finding all possible values.

$$x^2 + 7x - \underline{\quad}$$

KenKen Puzzles

A KenKen is an arithmetic puzzle invented in 2004 by a Japanese math teacher, Tetsuya Miyamoto. In the KenKen puzzle below, the numbers 1-5 only appear once in each row and once in each column. The bold, outlined sections indicate what numbers add, subtract, multiply, or divide to the number provided.

The 30x here means that the product of the numbers in these boxes is 30. This could be 1, 5, and 6, or 2, 3, and 5.

4	30x			5+
2÷	5+		5	
	3-	6+	2÷	8+
2-				
	12x		2÷	

Solve the four KenKen puzzles (including the one above) on the sheet provided.

Ratio Sudoku

In a regular Sudoku puzzle, each digit from 1-9 is exactly once in each row, each column, and each 3 x 3 highlighted square. In this Ratio Sudoku puzzle, the numbers in some adjacent squares are marked by clues: the two numbers in those squares form the ratio provided in simplest form.

For example. the numbers in these two squares may either be 5 and 9, or 9 and 5. These are the only two values that give this ratio. Note that order doesn't matter!

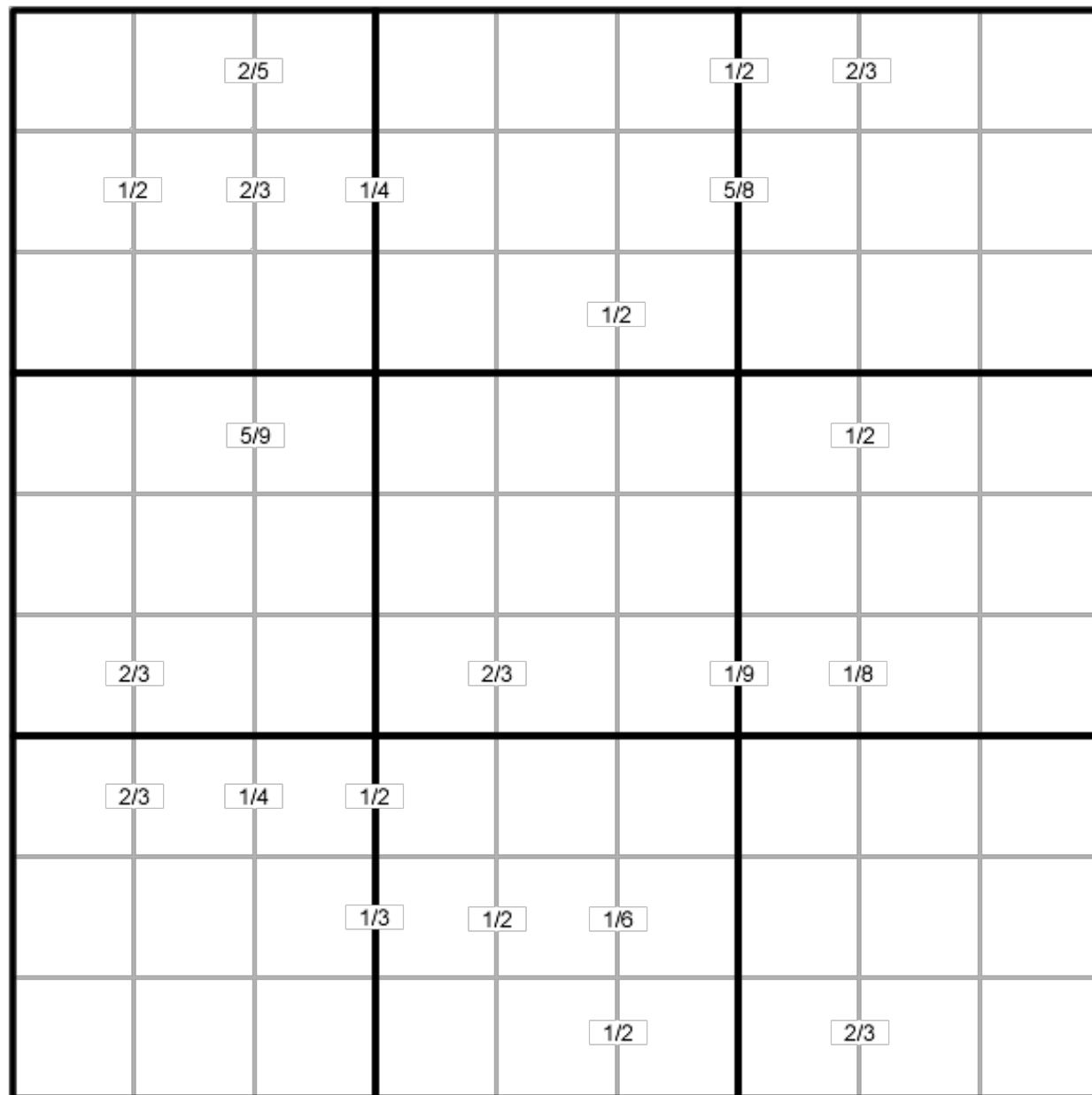Solve the Ratio Sudoku on the sheet provided!
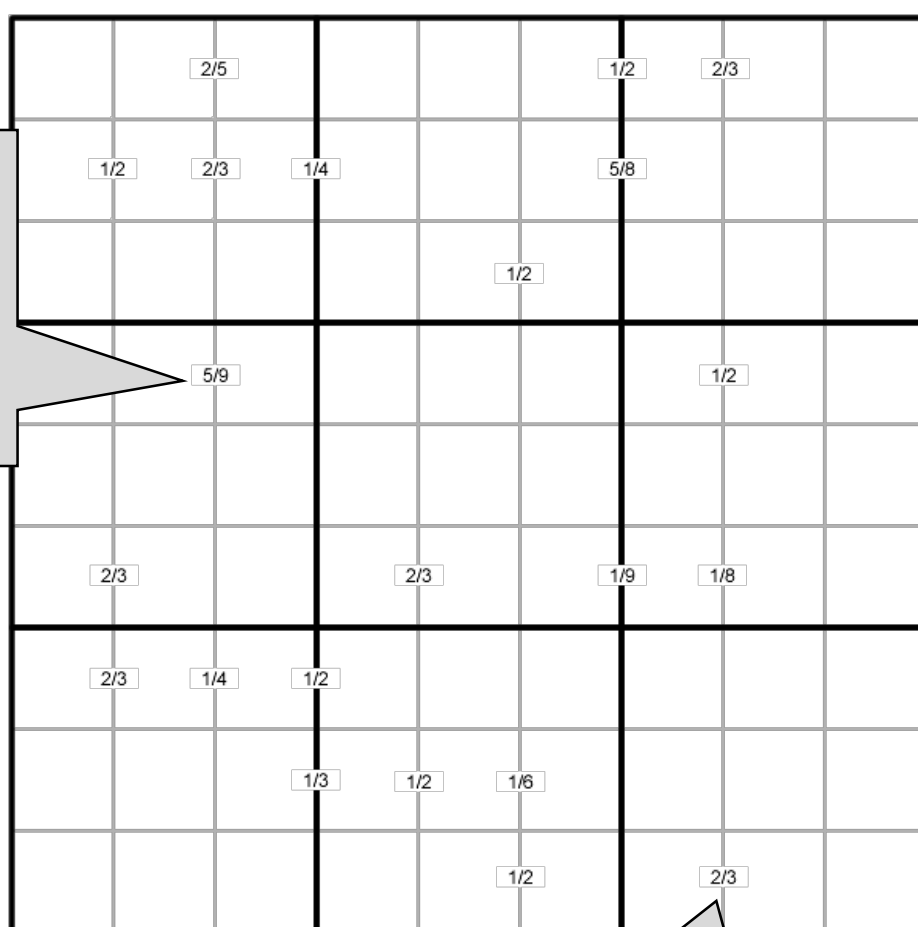
However, the numbers in these two boxes could be 2 and 3, 3 and 2, 4 and 6, 6 and 4, 6 and 9, or 9 and 6.

Ratio Sudoku

Prime Puzzle

Arrange the numbers 1 through 25 in the squares below so that the sum of every pair of numbers, either horizontally or vertically, is a prime number.