Yack in the Box

Part 1

Chen is creating a new game called "Yack in the box," and he needs assistance in finding the values of the playing pieces. How can he determine the fractional values of his game pieces?

- Work with a partner. A "yack" is a new rod whose length consists of 1 yellow Cuisenaire Rod and 1 black Cuisenaire Rod attached end-to-end.
- Using Cuisenaire Rods, make all one-color combinations that will match the length of the yack.
- Assume that the length of the yack represents one whole unit. For each of the one-color combinations, find the fractional part of a single rod in relation to the whole yack. Record the color of each rod and its fractional value.
- Now find the fractional value of each of the remaining rods with the yack representing 1 whole unit. Add your findings to the data already collected and arrange your data in increasing order of value.
- Look for patterns and relationships in the data. Be ready to explain your findings.

Part 2

What if... ***Chen is ready for you to play a game of "Yack in the Box"? Can you determine fractional relationships among the rods to help you win the game?***

- Work in pairs. Place a set of Cuisenaire Rods in a small box. Decide who will go first. Player A randomly selects 3 rods from the box.
- On a sheet of paper, Player A writes two addition sentences about the 3 rods. One equation should relate the colors of the rods and the other equation should relate their fractional values. Fractional values are to be expressed in terms of yacks. For example, $r + g + p = e$; $\frac{1}{6}$ yack + $\frac{1}{4}$ yack + $\frac{1}{3}$ yack = $\frac{3}{4}$ yack.
- Then Player A selects 2 of the 3 rods, and writes two subtraction sentences about them. One equation should relate the colors of the rods and the other equation should relate their fractional values. As before, fractional values should be expressed in terms of yacks. For example, $p - g = w$; $\frac{1}{3}$ yack − $\frac{1}{4}$ yack = $\frac{1}{12}$ yack.
- Player B checks Player A's equation sheet. If all statements are correct, Player A earns 1 point. If a mistake(s) is found, Player B can make the correction(s), and then he or she receives the point.
- After returning the 3 rods to the box, Player B selects 3 rods from the box, and he or she repeats the activity.
- Play continues by alternately drawing rods, writing the sets of equations, and checking results. The first player to earn 8 points is the winner.
- Be ready to discuss the results of your game.

Write a letter to Chen explaining the processes used when adding fractions and subtracting fractions. Include an explanation about the skills you used while playing "Yack in the box."