Great Pizza Dilemma

I am planning on having 5 friends over for a pizza party. I bought 3 pizzas (all the same size) for the party. One was divided into 4 equal parts, the 2nd was divided into 6 equal parts and the 3rd pizza was divided into 8 equal parts. Is there any possible way I can show how to share these pieces so that each one of us gets the same amount? If not, show how much each person gets.

Be sure to explain your reasoning clearly. Use any fraction pieces that are in the classroom or that you might like to make yourself.
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Suggested Grade Span

3-5

Task

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Alternate Versions of Task

More Accessible Version:

Six of us are having a pizza party. We are buying 3 pizzas to share. If each pizza must be cut into more than 2 pieces, show how to cut the pizzas so each of us gets a fair share.

More Challenging Version:

I am planning on having 5 friends over for a pizza party. I bought 3 pizzas (all the same size) for the party. One was divided into 4 equal parts, the 2nd was divided into 6 equal parts and the 3rd pizza was divided into 8 equal parts. Is there any possible way I can show how to share these pieces so that each one of us gets the same amount? If not, show how much each person gets. Be sure to explain your reasoning clearly. Use any fraction pieces that are in the classroom or that you might like to make yourself.

If I buy the following ingredients to put on the pizzas, determine how many slices of each should be put on each pizza.
1 stick of pepperoni, 1-foot long, cut into 1/4 inch thick slices

20 mushrooms, each cut into 3 pieces

4 slices of ham, each 5 inches x 4 inches, cut into 1 inch squares

**Context**

The benchmarks were taken from a fourth-grade class. They had just started studying fractions and were renaming equivalent fractions. I was intrigued when I saw work from a first grade class and wanted to see how fourth graders approached this problem.

**What This Task Accomplishes**

As I saw students solving this problem, I could detect those students that looked at the whole problem and those that started immediately to get involved with the details. A flexible mind that can step back from the task will probably solve the problem more easily. This problem gets kids to start thinking and working with fractions even with limited formal experience.

**What the Student Will Do**

Most students will start drawing pizza pies. My kids had a hard time in the beginning working with my rectangular fraction pieces, but got use to them when they thought of them as rectangular pizza pies. Many students counted the number of pieces and divided by six (number of people). Many then realized that the shares were not equal and wanted to know whether "same amount " meant number of pieces or size.

**Time Required for Task**

45 minutes

**Interdisciplinary Links**

Any social studies unit on groups and sharing.

**Teaching Tips**

As students ask about the "same size" question, I let them think about it and make a decision on their own. I feel this is really part of the problem.

**Suggested Materials**

- Fraction pieces
- Compass (to make circles)
- Rulers
Possible Solutions

The size of the pieces is important. Each person gets 1/2 a pie. That can be divided in two ways: Two people each getting 1/4, two people each getting 4/8, two people each getting 3/6. Another solution could be four people each getting 1/8 + 1/8 + 1/4 and two people sharing the sixths.

More Accessible Version Solution:

Pizzas should be cut so the total number of slices is a multiple of six.

More Challenging Version Solution:

12 x 4 = 48 one-fourth inch thick slices ÷ 3 pizzas = 16 slices per pizza

60 slices of mushrooms ÷ 3 = 20 slices of mushroom per pizza

20 squares of ham x 4 slices = 80 squares ÷ 3 pizzas = 26 2/3, so two pizzas will have 27 pieces, and one will have 26 pieces. Or, each pizza can have 26 and 2/3 square pieces of ham.

Task Specific Assessment Notes

Novice
This student divided the pieces equally, but did not consider the size of the pieces.

Apprentice
This student realizes each person should get the same amount of pizza, but also wants each person to get the same number of pieces.

Practitioner
This student understands that each person should get half a pizza. The solution shows the student has a broad understanding of the problem and the major concepts necessary for its solution.

Expert
This student shows a deep understanding of the problem and was able to find a second solution. S/he even generalizes the problem.