Paper-folding Fractions 1

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I am learning to create commonly used fractions by folding a piece of paper

Required Knowledge
Students need to be able to:
- Explain the concept of fractions as equal parts of the whole, as well as the relationship between the numerator and the denominator

Key mathematical ideas
- Fractions are identified from what part of the whole they occupy
- Fractions can be made by dividing other fractions into equal parts

Equipment
Numerous pieces of A5 paper to fold and cut

Using Materials/Representations
Ask students to work in groups of three or four. Give them three pieces of paper and tell them that they need to fold each piece of paper in half, but in a different way with each piece of paper. Once this task has been completed, ask students which one they think is the biggest, and why they think that. Some students will identify that the longest 'half' is the biggest as they are addressing length rather than area, which is at the heart of the paper model. If other students do not start explaining why they are must all be the same size, it is important to revisit what a fraction means. Put 2/3 on the board, and ask what this means, and if students can draw a diagram to show what 2/3. Emphasise that the whole has been cut into three equal pieces, and we have two of them, - then revisit the 'halves' that students have folded, and why they must be the same.

Using Imaging
Start with some other pieces of paper. Ask students how they might fold the piece of paper into quarters, and how many folds will be needed to make quarters. Develop the idea that only two folds are needed to make quarters, and that halving halves makes quarters. Once this idea has been developed, get the students to fold several pieces of paper into quarters, to confirm that only two folds are needed. Again ask them to fold quarters in several different ways, to confirm that halving the halves create quarters, regardless of the way that the halves are folded.

Using Number Properties
Ask the groups to discuss how they could make eighths. Once they have come up with several ideas, put the following on the board
    One fold gives halves
    Halves the halves to make quarters
    _____ the quarters to make _____

Once the third sentence has been completed, ask if any of these statements can be written with numbers. First aim to draw out the relationship between the different fractions, then go back and ask the students if they can write sentences that involve division. For example, the first statement could be "dividing a piece of paper into two gives us halves", which can be written as $1 \div 2 = \frac{1}{2}$ or as $\frac{1}{2}$ of 1 is $\frac{1}{2}$, (halving the whole gives us halves). The second can be written as either "we divide the paper into four by first dividing it into two, then dividing these pieces into two" , so $\div 4$ is the same as $\div 2 \div 2$ or as $\frac{1}{2}$ of $\frac{1}{2}$ = $\frac{1}{4}$.