Fractions, Decimal and Percentages Prior Assessment Question 12:

Objective: I can multiply a fraction by a fraction.

NC: NFDP 4 multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, 1/4 × 1/2 = 1/8]

Teacher Input Ideas:

Introduce to the children to the sum $\frac{1}{4}$ x $\frac{1}{2}$. Provide the children with time to discuss if they have seen it before, what it might mean and how they would work out the answer.

Introduce the idea of multiplying fractions practically. Use a large cake, pizza or circular template. The children can be provided with circular templates for exploring whilst you are modelling. We have $\frac{1}{4}$ of a cake left but we want to have $\frac{1}{2}$ of this piece each. Model splitting your resource into quarters and show one quarter. Ask the children for suggestions of what they think they need to do next if they are multiplying it by $\frac{1}{2}$. Model to the children that we need to split each piece into half. Count around the new size fractions to show that we now have 8 equal sizes. So, by multiplying each $\frac{1}{4}$ by $\frac{1}{2}$ we have created eighths. Allow the children time to ask questions about this and discuss what has happened.

Many children find the concept of multiplying decimals by decimals and fractions by fractions difficult because the size of the fraction and decimal gets smaller. When we multiply whole numbers, the size of the number increases. Allow time to discuss and explain why.

Now introduce $\frac{1}{4}$ and x by $\frac{1}{4}$. Allow children to have a go on their circular templates. Encourage the children to count around in 4s once they have cut each quarter into 4. Children should gradually notice that 16 pieces have been created and that 4 x 4 is 16.

Repeat with other fractions such as $\frac{1}{4}$ x 1/3.

Then model with 2/3 x $\frac{1}{4}$. Encourage the children to colour in 2/3 thirds of their circle. Split each third into 4 and count around. We have created twelfths. Look at how 2/12 have been created. Children may spot that this can be simplified to 1/6.

Some children may still need circular templates for the activities or may want to draw images to help them. Some children may notice that we can multiply the numerator by the numerator and the denominator by the denominator.

When children are ready, introduce fractions with numerators larger than 1. For example, 2/3 x 3/5.

Practice Activities

Purple Practice: Most suited for children who made errors in Question 12, and would benefit from multiplying fractions when the numerator is always 1.

For this learning objective, the children are presented with blocks that they can choose to multiply by each other. All purple blocks have 1 as the numerator. So, if the children are finding multiplying fractions by each other tricky, they can start with selecting only purple blocks (such as $\frac{1}{4}$ by $\frac{1}{4}$). The children should also be encouraged to use fractions templates, cakes or pizzas to support them with working out the answer. As the children gain confidence and demonstrate understanding, they can move on to selecting a green block to multiply by a purple block (such as $\frac{1}{4}$ x 2/5).

Green Practice: Most suited for children who made errors in Question 12.

All green blocks have numerators more than one. So, if the children are finding multiplying fractions with numerators more than 1 tricky, they could start with selecting one purple block and one green block to multiply by each other (for example $\frac{1}{4}$ x 3/5). The children may need to use fractions templates, cakes/ pizzas or drawings to support them with working out the answer and gradually understand how the numerator can be x by the numerator and the denominator can be x by the denominator. As the children gain confidence and demonstrate understanding, they can move on to selecting 2 green blocks to multiply by each other (for example 3/5 x 5/6).

Yellow: Most suited for children who showed understanding in Q12 and need to develop reasoning skills.

Encourage the children to show fluency of working out fraction x fraction by selecting different green cards to multiply by each other. When confident, the yellow task is to create a poster/presentation for the class or to teach others in the class, how to work out a fraction x a fraction. Often children remember the rule for multiplying fractions (numerator x numerator and denominator x denominator). This task should encourage the children to explain why this rule works and to show the children's understanding of x a fraction by a fraction. The children's presentation must include:

- Examples of multiplying fraction by fraction (1 numerator by numerator of 1).
- Examples of multiplying fraction by fraction (numerators other than 1).
- An explanation of what happens when a fraction is multiplied by a fraction using images/resources to support their explanation.
- The rule that can be used when multiplying fractions with an explanation of why it works.

- An explanation as to what is happening to the fraction and how this is different to when we multiply whole amounts by each other - demonstrating understanding that the size of the fraction is getting smaller as the denominator is increasing.

Mastery: The children are presented with a word problem involving a loaf of bread. You could present the children with an actual loaf of bread (which has 14 slices) to prompt discussion and suggestions as to how to solve this. Some children may need to use the loaf of bread to support them.

Encourage the children to understand that the whole loaf is 1. We have a fraction of the loaf, when we use one slice. What fraction of the loaf is one slice? Establish that a slice is 1/14 of the bread. We then know that to make the daughter's breakfast we cut the slice of bread into quarters. One triangle piece is 1/4. So, we are imagining that we are multiplying each slice by $\frac{1}{4}$. Children could do this practically if they need to. You can model to the children how to record this as the calculation they have performed ($1/14 \times \frac{1}{4}$).

Other children may need less support and prompting to understand that they can multiply 1/14 by $\frac{1}{4}$ to reach the answer of 1/56.

Answers:

Purple and green: Children to mark own with adult or in group as the answers are dependent on the combinations they have made.

Mastery:

1/14 x 1/4 = **1/56**

challenge: **4 days** with 2 slices spare

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Mathematics

Purple Practice

Lo: I can multiply fractions by each other when the numerator is 1.

Cut out the blocks and choose 2 at a time to multiply by each other. Explain how you have worked out the answer. You may need fraction circles, templates or resources to help.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

$\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{8}$

$\frac{1}{9}$ $\frac{1}{12}$ $\frac{1}{10}$

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

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Mathematics

Green Practice

Lo: I can multiply fractions by each other with numerators other than 1.

Cut out the blocks and choose 2 at a time to multiply by each other. Work out the answer. You may need fraction circles, templates or resources to help.

$\frac{3}{4}$ $\frac{4}{5}$ $\frac{2}{3}$

$\frac{2}{5}$ $\frac{3}{5}$ $\frac{5}{6}$

$\frac{2}{7}$ $\frac{6}{7}$ $\frac{4}{7}$

$\frac{3}{8}$ $\frac{5}{8}$ $\frac{4}{9}$

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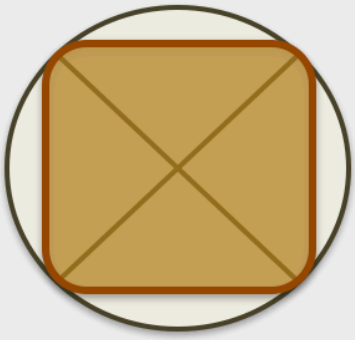
Mastery

Word problem and Fluency

There are 14 slices of bread in a loaf of bread that James has bought. He uses one slice of bread to make toast for his daughter. Once toasted, he cuts the slice of toast like this:



What fraction of the loaf of bread is one triangle piece of toast?

Challenge:

There are 3 people in James's family. How many days will the loaf of bread last if they each have 4 triangles a day?