ORIGO Insights

Fraction Target

2 players

Multiplying fractions

Purpose

In this game, the students use mental strategies to multiply common fractions by whole numbers. Estimation and prediction are encouraged.

Materials

Each pair of players will need

- One (1) set of numeral cards. Make two copies of the left-hand grid on page 50 (shown below) on red paper (or another available color). Cut out and laminate the cards to make one set.

- One (1) set of fraction cards. Make two copies of the right-hand grid on page 50 (shown below) on yellow paper (or another available color). Cut out and laminate the cards to make one set.

Each player will need

- A 'Fraction Target' score sheet (page 51) as shown below.

How to Play

The aim is to make a product that is as close as possible to the target number.

- The two sets of cards are shuffled and placed face down in separate stacks.

- The first player draws three red cards and three yellow cards. He or she considers all possible combinations before multiplying one of the numerals by one of the fractions to make a product that is as close as possible to the target number.

- The player records the number sentence on his or her score sheet then figures out and records how close the product is to the target.
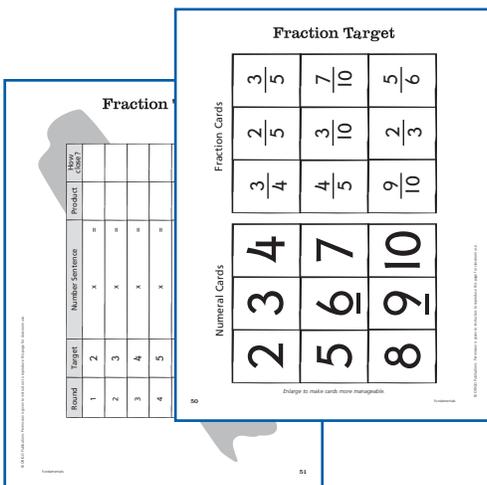
Example: In Round One, Jenna draws 4, 6, and 9, and $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{7}{10}$. She chooses to multiply $4 \times \frac{2}{3}$ and completes her score sheet as shown below.

Round	Target	Number Sentence			Product	How close?
1	2	4	x	$\frac{2}{3}$ =	$2\frac{2}{3}$	$+\frac{2}{3}$
2	3		x	=		

- The cards are returned and the stacks are reshuffled.

- The other player has a turn.

- The player who is closer to the target is the winner for the round. This is indicated with a ✔.

- The player who wins the greater number of rounds is the overall winner.

Reading the Research

The area model can be used to teach the meaning of multiplication of fractions. It is familiar to students and helps them to conceptualize the product (Wu, 2001).

Fraction Target

Fraction Cards

$\frac{3}{5}$	$\frac{7}{10}$	$\frac{5}{6}$
$\frac{2}{5}$	$\frac{3}{10}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{4}{5}$	$\frac{9}{10}$

Numeral Cards

2	3	4
5	6	7
8	9	10

Enlarge to make cards more manageable.

50

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Before the Game

Use area models to ensure students understand the concept of multiplying a fraction by a whole number. Relate the diagrams to real-life objects, such as pizzas or oranges. The diagram (right) shows that $3 \times \frac{3}{4} = \frac{9}{4}$. One of the 'pizzas' could be used to complete the other two pizzas, showing that $\frac{9}{4} = 2\frac{1}{4}$.
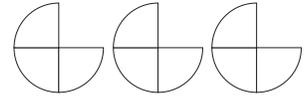
During the Game

Watch how players are choosing which cards to multiply. Do the players choose pairs of cards in which the numeral card and the denominator match? To score an exact target it is necessary to get a numerator which is a multiple of the denominator. For example, the following number sentences will score a target of 3: $4 \times \frac{3}{4} = \frac{12}{4}$, $5 \times \frac{3}{5} = \frac{15}{5}$, and $10 \times \frac{3}{10} = \frac{30}{10}$.

How are the players determining the winner if each player has a fraction with a different denominator? For example, after one round, one player may write '$+\frac{1}{4}$' in the 'How Close?' column and the other player may write '$-\frac{1}{5}$'. Can they see that '$-\frac{1}{5}$' is closer to the target than '$+\frac{1}{4}$'?

After the Game

Give the students some short investigative activities. For example, ask students to figure out one way to score the exact target for each round. The students should notice that several of the targets can be achieved in more than one way. Afterward, challenge the students to explain why no target exceeds 9. (The fractions are less than one and no numeral exceeds 10.) The students could also figure out the greatest possible product and smallest possible product in this game. ($10 \times \frac{9}{10} = 9$ and $2 \times \frac{2}{5} = \frac{4}{5}$ respectively.)

Beyond the Game

- Vary the rules by eliminating the targets. The players can aim to make any product that is a whole number. A player can make the same whole-number product more than once. The winner is the player who scores the greater number of these products after a set number of rounds.

- The players could aim for products within a given range, for example, 3-6. The player who scores the greater number of products within the range is the winner.

- Numerals 11 and 12 could be added to the pack of numeral cards.

Fraction Target

Fraction Cards

$\frac{3}{5}$	$\frac{2}{5}$	$\frac{3}{4}$
$\frac{7}{10}$	$\frac{3}{10}$	$\frac{4}{5}$
$\frac{5}{6}$	$\frac{2}{3}$	$\frac{9}{10}$

Numeral Cards

4	3	2
7	6	5
10	9	8

Enlarge to make cards more manageable.

Fundamentals

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Fraction Target

Round	Target	Number Sentence		Product	How close?
1	2	×	=		
2	3	×	=		
3	4	×	=		
4	5	×	=		
5	6	×	=		
6	7	×	=		
7	8	×	=		
8	9	×	=		