Fraction Facts

3 players

Calculating fractions

Purpose

In this game, the students practice finding one-half, one-third, one-fourth, three-fourths, one-fifth, two-fifths, three-fifths, and four-fifths of certain numbers. The students can draw on their knowledge of multiplication and division facts to help them derive the answers.

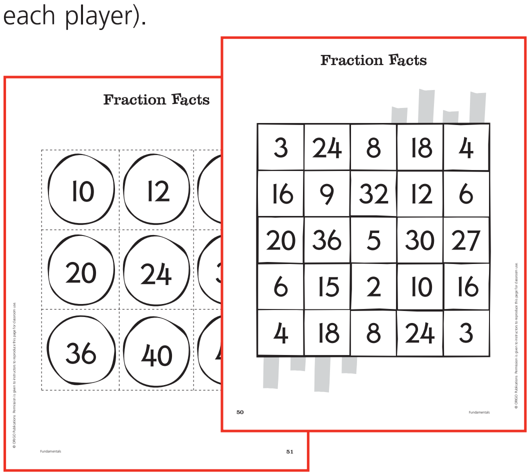
Materials

Each player will need

- A 'Fraction Facts' game board (page 50) as shown below.
- One (1) set of numeral tokens. Copy page 51 as shown below. Cut out and laminate the tokens to make one set.
- Two (2) fraction cubes made from blank wooden cubes. One cube should show the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{5}$, and $\frac{2}{5}$. The second cube should show $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{5}$, and $\frac{4}{5}$.

Each player will need

- Five (5) counters (a different color for each player).


Fraction Facts

3	24	8	18	4
16	9	32	12	6
20	36	5	30	27
6	15	2	10	16
4	18	8	24	3

How to Play

The aim is to place all five counters on the game board.

- The numeral tokens are placed face up.
- The first player selects a token then rolls the two fraction cubes.
- The player chooses one of the fractions and mentally calculates that fraction of the number on the token to give an answer that is on the game board.

  Example: Jack selects the token showing 24 and rolls $\frac{1}{5}$ and $\frac{3}{4}$. He chooses to use $\frac{3}{4}$ and mentally calculates $\frac{3}{4}$ of 24. He then claims 18 on the game board.

- The player claims the answer by covering it with a counter. Although some numbers appear more than once on the game board, a player may only claim one number for each turn. If both possible answers are unavailable, the player misses a turn.
- The token is returned.
- Each of the other players has a turn.
- The first player to place his or her five counters on the board is the winner.

Reading the Research

It is crucial for middle grades instruction to strengthen students understanding of fraction concepts, order and equivalence before progressing to operations of fractions, rather than assuming that students already understand these topics (Bezuk & Bieck, 1993).

Before the Game

Write the number '24' on the board. Ask the students to figure out 'fraction facts' of 24 using their knowledge of multiplication. For example, they could write the list shown at right. Repeat this activity using other numbers such as 12, 15, 30, 36, and 40.

$\frac{1}{2}$ of 24 = 12
$\frac{1}{3}$ of 24 = 8
$\frac{1}{4}$ of 24 = 6
$\frac{1}{6}$ of 24 = 4
$\frac{1}{8}$ of 24 = 3
$\frac{1}{12}$ of 24 = 2
$\frac{2}{3}$ of 24 = 16
$\frac{3}{4}$ of 24 = 18
$\frac{2}{8}$ of 24 = 6
and so on...

Introduce the game by inviting three students to play on the overhead projector using transparent counters of three different colors. Each student could play for one third of the class. Members of each team can offer strategies for calculating the answer.

During the Game

Encourage the students to share the strategies they use to find the fraction. For example, to calculate $\frac{3}{4}$ of 20, the students may say, ***I know one fourth of 20 is 5 because 4 fives are 20. So three fourths must be 5 times 3. That's 15.*** Other students may use a 'fact' they know, ***Two fourths or one half of twenty is 10 so three fourths must be 15.***

After the Game

Show a transparency of the game board. Place a counter on one '6' as shown. Ask, ***If I rolled $\frac{1}{4}$ and 6 was the answer, what was the whole?*** (24.) ***How do you know?*** Encourage the students to share their thinking. Place another counter on an 8. Ask, ***Suppose 8 was the answer and I rolled $\frac{1}{3}$, what token did I start with?*** (24.) Repeat this line of questioning for other numbers and unit fractions before progressing to questions involving $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, or $\frac{4}{5}$.

3	24	8	18	4
16	9	32	12	6
20	36	5	30	27
6	15	2	10	16
4	18	8	24	3

Beyond the Game

Vary the game by changing one rule. Rather than returning the token after each turn, keep the token and return them all after the last one has been used. This will limit the players' options.

Fraction Facts

3	24	8	18	4
16	9	32	12	6
20	36	5	30	27
6	15	2	10	16
4	18	8	24	3

Fraction Facts

10	12	15
20	24	30
36	40	48

Think BIG

2 players

Calculating fractions

Purpose

This game requires the students to draw on a range of mental strategies to calculate fractions of multiples of ten.

Materials

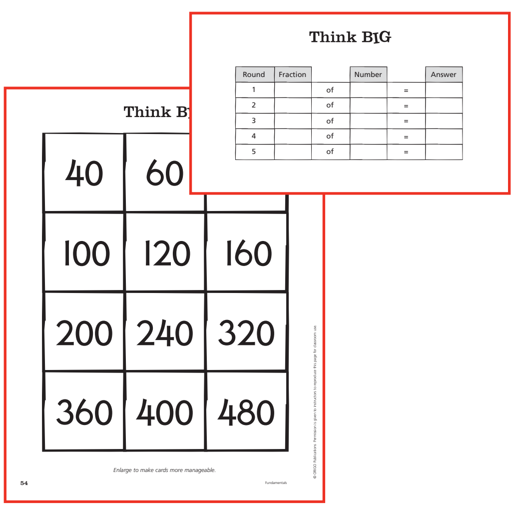
Each pair of players will need

One (1) set of numeral cards. Copy page 54 as shown below. Cut and laminate the cards to make one set.

Two (2) fraction cubes made from blank wooden cubes. One cube should show the fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{3}{5}$. The second cube should show $\frac{3}{4}$, $\frac{4}{5}$, $\frac{1}{10}$, $\frac{3}{10}$, $\frac{7}{10}$, and $\frac{9}{10}$.

Each player will need

A 'Think Big' game board shown in the top half of page 55 (illustrated below).



How to Play

The aim is to achieve the greater answer.

- The cards are shuffled and placed face down in a stack.
- The first player draws the top card and records the number drawn in the 'Number' column on his or her game board.
- The player then rolls the two number cubes and decides which of the two fractions will result in the greater answer.

  Example: Rebecca draws 240 and rolls $\frac{3}{4}$ and $\frac{1}{10}$. She decides to use $\frac{3}{4}$ because $\frac{3}{4}$ of 240 = 180 and $\frac{1}{10}$ of 240 = 24.

- The player records this fraction in the 'Fraction' column. Once a decision has been made, it cannot be changed.
- The player calculates the answer mentally and records it in the 'Answer' column. If the player is unable to calculate the answer, he or she does not record a result for that round.
- The card is discarded to one side.
- The other player has a turn.
- The player with the greater answer at the end of a round is the winner. This is indicated with a ✓.
- The player who wins the greater number of rounds is the overall winner.

Reading the Research

Students often bring to the classroom a rich store of informal knowledge about fractions that they are able to build on to give meaning to formal symbols and procedures (Mack, 1990).

Before the Game

Place twenty counters on an overhead transparency or a table for all to see. Invite a student to divide the counters into fourths. Ask, ***How many equal groups can you see?*** (4.) ***What do we call each group?*** (One-fourth.) ***What is one-fourth of 20?*** (5.) ***What is three-fourths of 20?*** (15.) ***How do you know?*** The discussion will vary, but the students may say, ***One-fourth is 5 so three-fourths is 5 times 3. That's 15.*** Regroup the counters and ask another student to divide them into fifths. The students can then calculate $\frac{2}{5}$, $\frac{3}{5}$, and $\frac{4}{5}$ of 20. Repeat the activity again with tenths.

During the Game

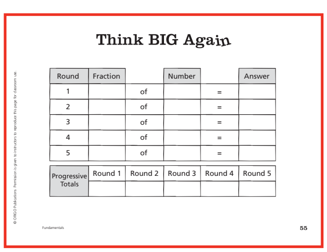
Listen to the players as they calculate $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{10}$. Are they using related division or multiplication 'facts' when it is appropriate to do so? For example, a student may say, ***One-fourth of 240 must be 60 because 24 divided 4 is 6,*** or ***… because 60 times 4 is 240.*** Do the students use the same method to calculate each and every fraction, or do they figure out certain fractions differently?

After the Game

Lead a discussion about the strategies used by the students. Ask questions such as, ***How would you mentally calculate $\frac{3}{4}$ of 120?*** One student may say, ***One-fourth of 120 is 30, so three-fourths must be 30 x 3. That's 90.*** Another student may say, ***One-fourth is 30, so if I take that from 120 it will leave three-fourths. That's 90.*** How would the students calculate examples such as $\frac{1}{5}$ of 240? Here are two possible methods.

Erin: *I simply divide 240 by 5. One-fifth is 48.*

Eric: *I know one-tenth of 240 is 24, so one-fifth must be 48 because one-fifth is the same as two-tenths.*


Think BIG Again

Round	Fraction		Number		Answer
1		of		=	
2		of		=	
3		of		=	
4		of		=	
5		of		=	

Progressive Totals	Round 1	Round 2	Round 3	Round 4	Round 5

Fundamentals 55

Beyond the Game

'Think Big Again' is a version that requires the players to keep progressive totals of their answers. The winner is the player with the greater total after five rounds. Each player will need a copy of the game board shown at the bottom of page 55 (illustrated).

Ask students to make a new game using different fraction cubes. Have them make a list of other fractions that could be used with the set of numeral cards. It is possible to use thirds for the numbers 60, 120, 240, 360, and 480. It is also possible to use eighths for 40, 80, 120, 160, 200, 240, 320, 360, 400, and 480.

Think BIG

40	60	80
100	120	160
200	240	320
360	400	480

Enlarge to make cards more manageable.

Think BIG

Round	Fraction		Number		Answer
1		of		=	
2		of		=	
3		of		=	
4		of		=	
5		of		=	

Think BIG Again

Round	Fraction		Number		Answer
1		of		=	
2		of		=	
3		of		=	
4		of		=	
5		of		=	

Progressive Totals	Round 1	Round 2	Round 3	Round 4	Round 5