

Factor Frenzy

Reporting Categories Computation and Estimation and Number and Number Sense

Topic Determining common multiples and factors

Primary SOL 4.5 The student will
a) determine common multiples and factors, including least common multiple and greatest common factor.

Related SOL 4.2a, b, c, 4.3a, b, c, d

Materials

- Multiplication table
- Factor Frenzy Game Recording Sheet (attached)
- Factor Frenzy Game Board (attached)
- Multiple game markers (e.g., checkers, colored chips, colored cubes) in two different colors
- Large paper clips
- Common Factors Venn Diagram (attached)

Vocabulary

factor, common factors, greatest common factor (GCF), multiplication/division related facts

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Ask students to define the mathematical term *factor*. If they are unable to provide a valid definition, have them give examples of factors to help them generate the definition for themselves. Display or hand out copies of a multiplication table, if needed.
2. Ask students to give you all the factors for 8, and prompt them to give the factor pairs, not just one number. For example, if a student says that 4 is a factor of 8, ask how he/she knows that. The response should be, "Because $2 \times 4 = 8$." Ask for factors of other numbers, and list them on the board. Have students look for similarities and differences among the factors. (For example, all numbers have 1 and the number itself as factors.)
3. Group students into pairs, and give each pair a copy of the Factor Frenzy Game Recording Sheet and the Factor Frenzy Game Board. Have pairs play the Factor Frenzy Game, as directed on the recording sheet.

Assessment

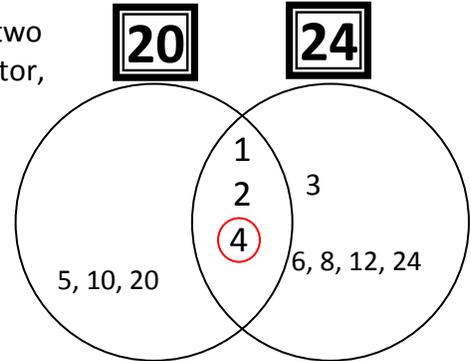
- **Questions**
 - When playing the game, if your opponent needs to cover the 81 square to win, which factor should you *not* point to with a paperclip?
 - Is it important to know what numbers your opponent has covered? Why, or why not?
 - Is it important to know what numbers your opponent needs to cover to win? Why, or why not?
 - Is it important to know what numbers you have covered? Why, or why not?
 - Is it important to know what numbers you need to cover to win? Why, or why not?

- **Journal/Writing Prompts**

- Explain whether it is better to go first or second in the game. Explain your reasoning.
- Identify the number it is best to choose *first*, and explain your reasoning.

- **Extensions and Connections (for all students)**

- Introduce greatest common factor (GCF) by displaying two numbers that students have had the opportunity to factor, e.g., 20 and 24. Define *greatest common factor* as the largest factor that is shared by the given numbers— i.e., the largest number that can divide evenly into the given numbers. Distribute copies of the attached Common Factors Venn Diagram, and display a similar diagram as a visual to help students find the common factors and GCF of the two numbers, using the steps listed on the handout.



1. Factors of 20: 1, 2, 4, 5, 10, 20
Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24
2. Common factors: 1, 2, 4
3. GCF: 4

Have students use the Venn diagram to find the GCF of several pairs of given numbers and write a statement to explain the diagram.

- Divide students into two teams. Go over the directions for Number Ray Investigators, as found in the Enhanced Scope and Sequence lesson of the same name (see *ess_4-5a_3.doc*). Teams take turns finding numbers that go on the special number rays. As students play this game, they should see that the factors of the number are on the left side of the number and the multiples of the number are to the right of the number. To help students remember the difference between factors and multiples, “F” stands for factor (of which there are just a few), while “M” stands for multiple (of which there are many millions).

Factor Frenzy Game Recording Sheet

Materials

- Factor Frenzy Game Board
- Multiple game markers (e.g., checkers, colored chips, colored cubes) in two different colors
- Two large paperclips

Object of Game

To be the first player to cover four squares in a row horizontally, diagonally, or vertically

Directions

1. Each player tosses a game marker onto the game board. The player whose marker lands on the largest number chooses a game-marker color, collects a pile of markers in that color, and becomes Player 1. Player 2 collects a pile of markers in the other color.
2. Player 1 places two paperclips at the bottom of the game board so that they point to two different factors. Then, Player 1 multiplies the two factors and places one of his/her game markers on the product square on the game board. Player 1 records the factors and product in the chart at right.
3. Player 2 slides *one* paperclip to point to a different factor, leaving the other paperclip in place. It is permitted to slide the paperclip to point to the same factor as the other paperclip. Then, Player 2 multiplies the two factors and places one of his/her game markers on the product square. Player 2 records his/her play in the chart.
4. Players take turns sliding *one* paperclip, multiplying the two factors, covering the product square, and recording the play. The first player to cover four squares in a row horizontally, vertically, or diagonally wins!

PLAYER	FACTORS	PRODUCT
1	×	
2	×	
1	×	
2	×	
1	×	
2	×	
1	×	
2	×	
1	×	
2	×	
1	×	
2	×	

TIP: Try to figure out in advance what product(s) you need next in order to cover four squares in a row. Then, see whether you can move a paperclip to achieve one of those products!

Factor Frenzy Game Board

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

Factors

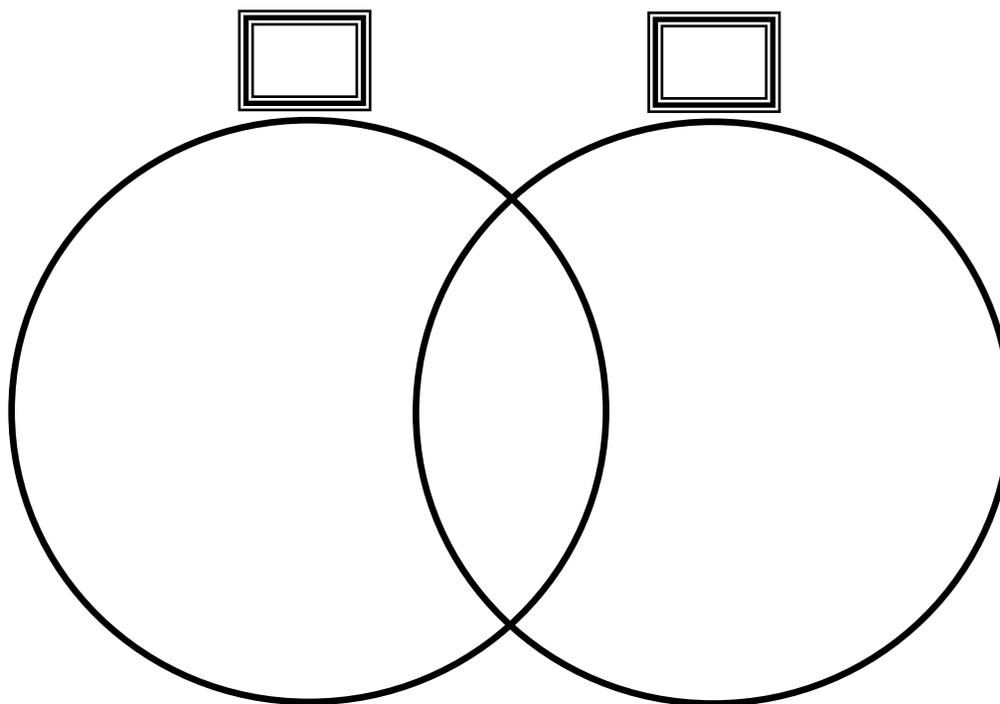
1 2 3 4 5 6 7 8 9
| | | | | | | | |

Common Factors Venn Diagram

Name _____ Date _____

Directions

1. Write the two given numbers in the boxes above the circles.
2. List the factors of each number in the circle below the box, placing common factors in the overlapping parts of the two circles.
3. Identify and circle the greatest common factor (GCF) of the two given numbers—i.e., the largest number in the overlapping parts.



4. Explain the diagram to someone who does not know what it means. _____
- _____
- _____