0.2b Class Activity: Greatest Common Factor

1. Giada is planting tulip bulbs in a flower garden at her plant nursery. She has 36 tulip bulbs that she would like to plant. She wants to plant them in rows of equal size and use all her bulbs. How many rows of tulips can she plant? List all the possible combinations by organizing your numbers in a table and explain your answer.

Number of Rows	Number of Tulip Bulbs in a Row
1	36
2	18
3	12
4	9
6	6
9	4
12	3
18	2
36	1

Since she wants the same number of tulips per row the number of tulips that go into a row must be a factor of 36. Likewise the number of rows is also a factor of 36.

As students work through the task review important concepts about factors as learned in 4th grade. (4.OA.4)

- What are factors?
- How do you know if a number is a factor of another number?
- How do you know if you have found all of the factors of a given number?

2. Giada also has 24 daffodil bulbs that she would like to plant. Similarly she wants to plant the daffodils in rows of equal size and use all of her bulbs. How many rows of daffodils can she plant? List all combinations by organizing your numbers in a table and explain your answer.

Number of Rows	Number of daffodils per row
1	24
2	12
3	8
4	6
6	4
8	3
12	2
24	1

Since she wants the same number of daffodils per row the number of daffodils that go into a row must be a factor of 24. Likewise the number of rows is also a factor of 24.

If desired you can also relate the factors to the dimensions of all of the rectangles that you can make using 24 squares. This is easy to do within this context because the garden plot is made up of rows of equal flowers which makes a rectangle. This will remind students that the factors of a product relate to the dimensions of an area model (3.MD7c). This connection is important when discussing the distributive property later on in this section.

3. Giada decides to just plant the tulip and daffodils next to each other since they bloom around the same time of year and look so pretty together. She would like to use all of her bulbs and wants each row to have an equal number of tulips and an equal number of daffodils. How many rows can she make? List all combinations by organizing your numbers in a table. Justify your answer.

Number of Rows	Number of tulips per row	Number of daffodils per row
1	36	24
2	18	12
3	12	8
4	9	6
6	6	4

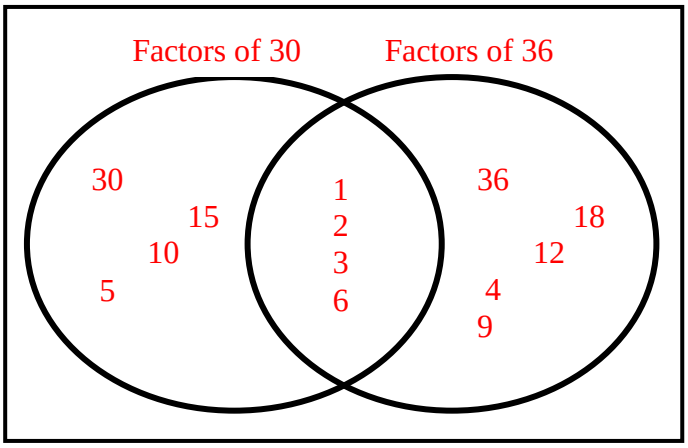
The number of rows must both be a factor of 24 and 36.
Discuss what common factors are and how to find them.
The common factors show all of the possible row combinations. The table shows these combinations along with the number of each type of flower that would go in each row.

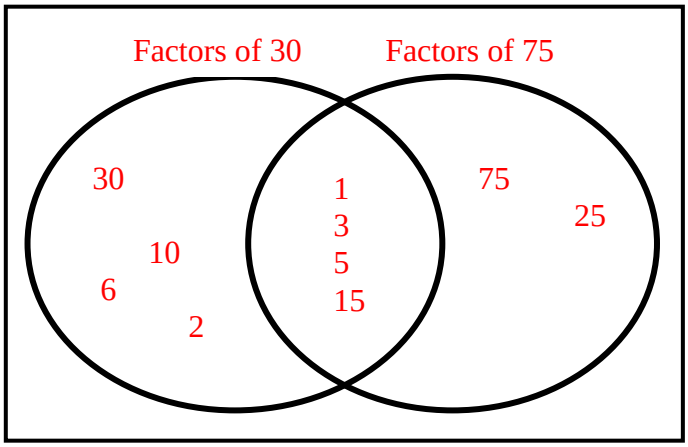
4. What is the greatest number of rows she can make by combining the tulips and daffodils together?
From the table you can see that the greatest number of rows is 6. It will have 6 tulips and 4 daffodils.
The greatest number of rows that she can make corresponds to the greatest common factor. Discuss what a greatest common factor (GCF) is and how to find it.

5. In the box write down what a Greatest Common Factor is.

Greatest Common Factor (GCF):
The Greatest Common Factor between two numbers is the greatest of all of their common factors.

6. Use a Venn Diagram to find the GCF of pair of numbers.
   a. 30 and 36
   b. 30 and 75





The GCF of 30 and 36 is 6

The GCF of 30 and 75 is 15

Encourage students to use the Divisibility Rules as they find factors of 30, 36, and 75.

7. Make a list of factors to find the GCF of each pair of numbers.

a. 16 and 56
8

b. 21 and 45
3

c. 32 and 54
2

d. 25 and 50
25

e. 51 and 85
17

f. 40 and 63
1

Sometimes it can be time consuming to list all of the factors of a number especially if it is a really big number. Rather than writing out a list of factors for each number you can use the each number's prime factorization to find the greatest common factor.

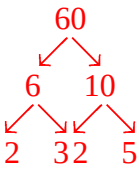
Review with students what prime and composite numbers are and how you can determine if a number is prime or composite. This was done in 4th grade. (4.OA.4)

To find the ***prime factorization*** for a number write the number as a product of its prime factors. To do this we will make a ***factor tree.***

Use the problems below to teach students how to write the prime factorization for a number. Be sure to show them that you will arrive at the same prime factorization regardless of the two factors that you start the tree with.

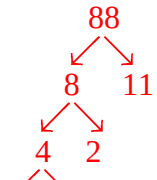
8. Make a factor tree to write the prime factorization for each number.

a. 60



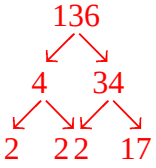
$60 = 2 \cdot 2 \cdot 3 \cdot 5$

b. 88



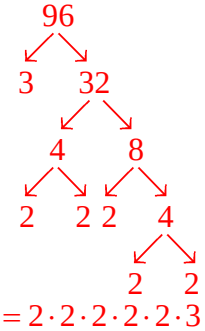
$88 = 2 \cdot 2 \cdot 2 \cdot 5$

c. 136



$136 = 2 \cdot 2 \cdot 2 \cdot 17$

d. 96



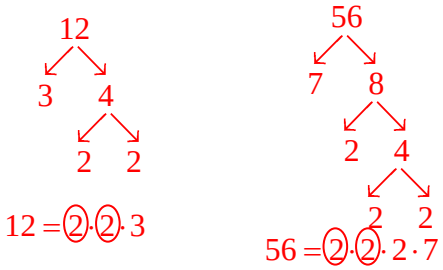
$96 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$

10. Find the prime factorization for each number in a given pair. Then use the prime factorization to find the GCF.

Once students have written out the prime factorization ask them how they think they can find the GFC from the prime factorizations. Some probing questions are below.

- What do we know about a GCF? It must be a factor common to both numbers.
- Can you circle the common prime factors for each number?
- How can use the common prime factors to get the greatest common factor? Multiply all the common prime factors together.
- It may be helpful to once again use a Venn diagram, but with the prime factors.

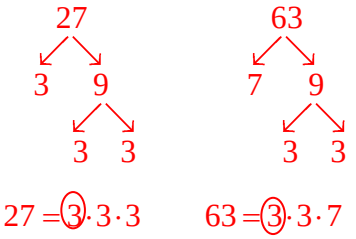
a. 12 and 56



Common prime factors are 2 and 2

$GCF = 2 \cdot 2 = 4$

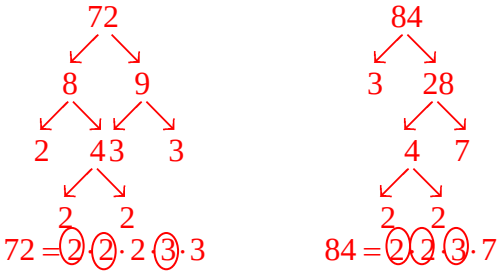
b. 27 and 63



Common prime factors are 3 and 3

$GCF = 3 \cdot 3 = 9$

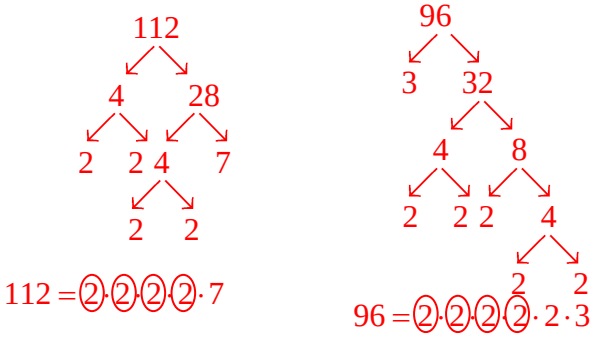
c. 72 and 84



Common prime factors are 2, 2, and 3

$GCF = 2 \cdot 2 \cdot 3 = 12$

d. 112 and 96



Common prime factors are 2,2,2,2

$GCF = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

11. Valerie is assembling "goodie" bags for her friends. She has 92 trading cards and 23 mood rings to put into the bags. What is the greatest number of bags that she can assemble with no items left over? How many of each item will be in each bag?

She can assemble 23 bags; each bag will have 23 trading cards and 4 mood rings.

12. There are 60 girls and 48 boys that want to participate in a STEM competition. If each team must have the same ratio of girls to boys what is the greatest number of teams than can participate? How many girls and boys will be on each team?

There will be 6 teams; each team will have 10 girls and 8 boys.