



Greatest Common Factor and Least Common Multiples

GCF and LCM



Greatest Common Factor

- **What is the difference between a factor and a multiple?**
- **Give me an example of a factor of 15**



Least Common Multiples

- Give me an example of a multiple of 15
- What is the difference between a factor and a multiple?



GCF

**How would you
find the GCF of 60
and 96?**

Methods to find GCF

There are actually 3 ways. You can use

- prime factorization,
- birthday cake method/ladder or list method or
- write out all the factors for each number.



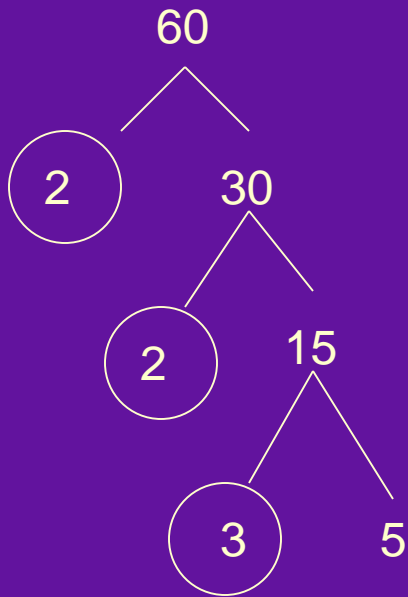
List Method

GCF 60 and 96

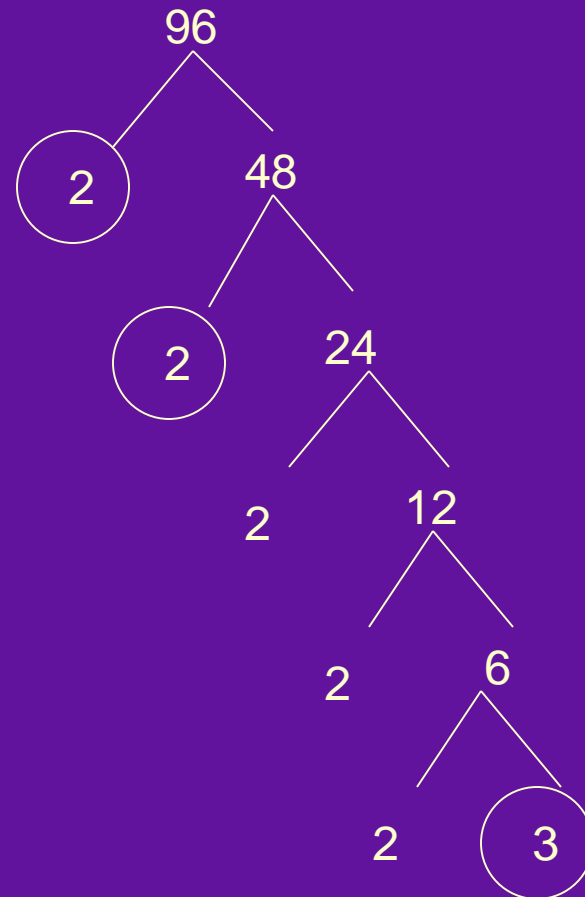
60 - 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

96 - 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

● ● ● Prime factorization method. Circle all the primes the 2 numbers have in common and multiply one set of them to get your GCF.



$$2 \times 2 \times 3 = 12$$





Birthday Cake or Ladder Method



	1
2	2
2	4
3	12
5	60

GCF

$$2 \times 2 \times 3 = 12$$

	1
2	2
2	4
2	8
2	16
2	32
3	96

Multiple

A number that is the product of a given number and a whole number

○ *Example:*

10	10	10	10	
<u>x 1</u>	<u>x 2</u>	<u>x 3</u>	<u>x 4</u>	
10	20	30	40	← multiples of 10

Least Common Multiple (LCM)

The least number other than zero, that is a multiple of two or more given numbers

Example List Method:

- multiples of 6: 6, 12, 18, 24, 30, 36
- multiples of 9: 9, 18, 27, 36, 45, 54
- The LCM of 6 and 9 is 18.

Least Common Multiple (LCM)

There are 3 ways to find the LCM.

- **list the multiples of the numbers**
- **multiply the numbers times each other and divide by the GCF.**
- **You can use the Indian Method/Ladder Method (you must divide by prime numbers only).**

Find the LCM of 12 and 18

LIST METHOD

- Multiples of 12 are...

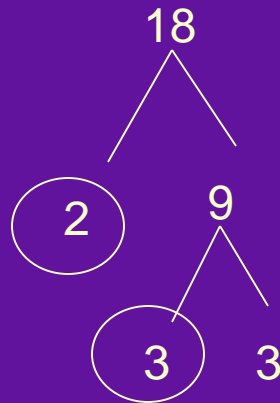
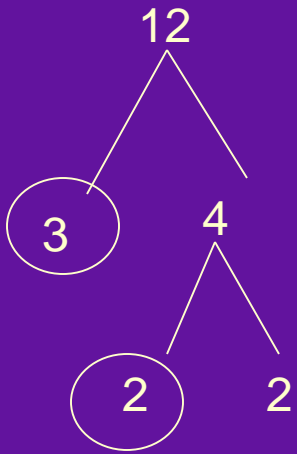
12, 24, 36, 48, 60, 72,

- Multiples of 18 are...

18, 36, 54, 72, 90, 108, ...

The smallest multiple the 2 numbers have in common is the least common multiple.

Prime factorization. Write down the number they have in common only once, then write down the leftover numbers. Multiply them all together.



Numbers in common are 2 and 3

Leftover numbers are 2 and 3

$$2 \times 3 \times 2 \times 3 = 36$$



DIVIDE BY GCF METHOD

Find LCM of 12 and 18

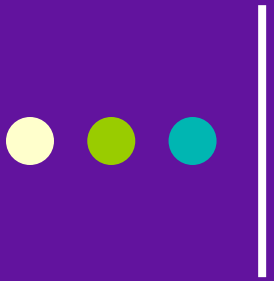
1st Find GCF – list all factors or use your favorite method.

12 – 1, 2, 3, 4, 6, 12

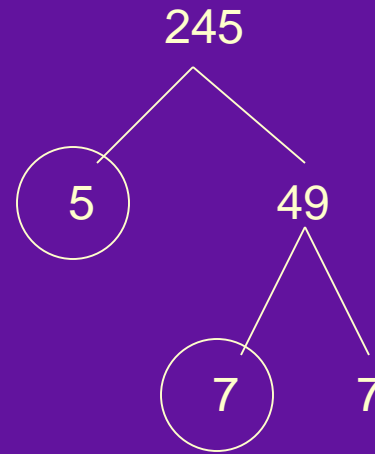
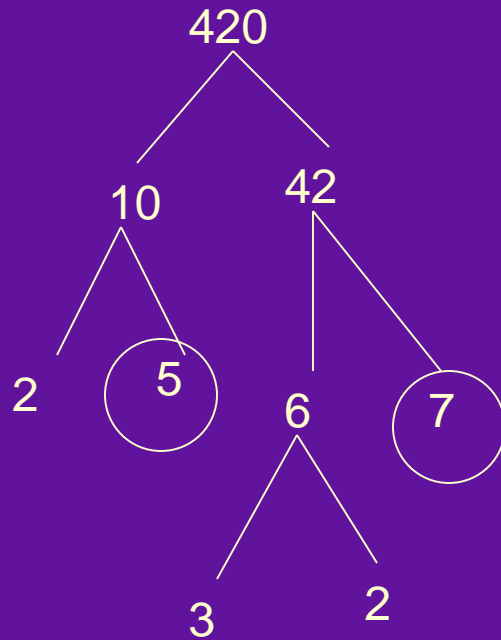
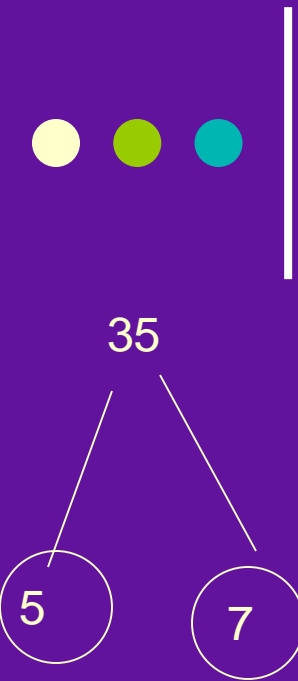
18 – 1, 2, 3, 6, 9, 18

2nd Multiply $12 \times 18 = 216$

3rd Divide $216 \div 6 = 36$



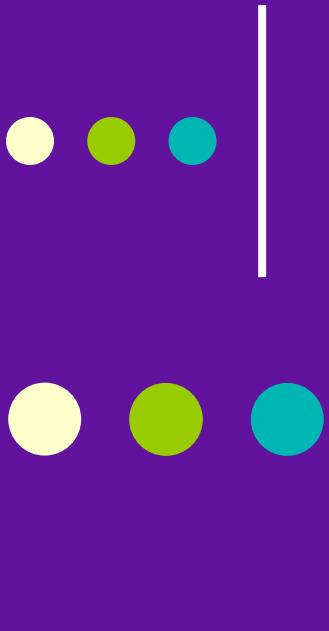
Find the LCM of 35, 420
and 245



Numbers they have in common: 5 and 7

Leftover numbers: 2, 3, 2, 7

Multiply them all together: $5 \times 7 \times 2 \times 3 \times 2 \times 7 = 2,940$



GCF and LCM Problem Solving

How can you tell if a word problem requires you to use Greatest Common Factor or Least Common Multiple to solve?



GCF and LCM Problem Solving

**First, use the KWL method for
approaching all problems...**

- **K:** What do you know?
- **W:** What do you want to know
- **L:** What did you learn?



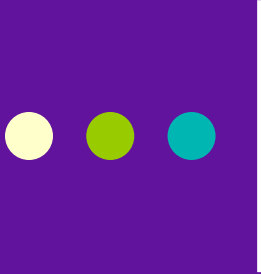
If it is a GCF Problem

- What is the question asking us?
- Do we have to split things into smaller sections?
- Are we trying to figure out how many people we can invite?
- Are we trying to arrange something into rows or groups?



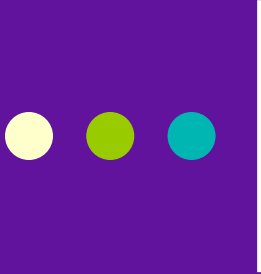
GCF Example: Applying what we have learned...

- Samantha has two pieces of cloth. One piece is 72 inches wide and the other piece is 90 inches wide. She wants to cut both pieces into strips of equal width that are as wide as possible. How wide should she cut the strips?



Samantha has two pieces of cloth. One piece is 72 inches wide and the other piece is 90 inches wide. She wants to cut both pieces into strips of equal width that are as wide as possible. How wide should she cut the strips?

- K: The pieces of cloth are 72 and 90 inches wide.
- W: How wide should she cut the strips so that they are the largest possible equal lengths.



Samantha has two pieces of cloth. One piece is 72 inches wide and the other piece is 90 inches wide. She wants to cut both pieces into strips of equal width that are as wide as possible. How wide should she cut the strips?

- L: This problem can be solved using Greatest Common Factor because we are cutting or “dividing” the strips of cloth into smaller pieces (factor) of 72 and 90.
- Find the GCF of 72 and 90



GCF Word Problem Solution

$$2 \overline{)72}$$

$$2 \overline{)36}$$

$$2 \overline{)18}$$

$$3 \overline{)9}$$

$$3 \overline{)3}$$

1

$$2 \overline{)90}$$

$$3 \overline{)45}$$

$$3 \overline{)15}$$

$$5 \overline{)5}$$

1

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$90 = 2 \times 3 \times 3 \times 5$$

$$\text{GCF} = 2 \times 3 \times 3 = 18$$

Samantha should cut each piece to be 18 inches wide



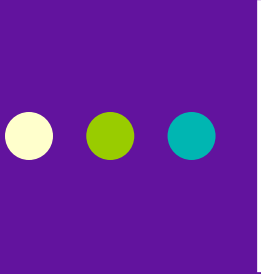
If it is an LCM Problem

- What is the question asking us?
- Do we have an event that is or will be repeating over and over?
- Will we have to purchase or get multiple items in order to have enough?
- Are we trying to figure out when something will happen again at the same time?



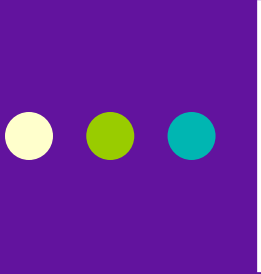
LCM Example: Applying what we have learned...

- Ben exercises every 12 days and Isabel every 8 days. Ben and Isabel both exercised today. How many days will it be until they exercise together again?



Ben exercises every 12 days and Isabel every 8 days. Ben and Isabel both exercised today. How many days will it be until they exercise together again?

- **K:** Ben exercises every 12 days and Isabel every 8 days and they both exercised today.
- **W:** How many days is it until they will both exercise on the same day again.



Ben exercises every 12 days and Isabel every 8 days. Ben and Isabel both exercised today. How many days will it be until they exercise together again?

- **L:** This problem can be solved using Least Common Multiple. We are trying to figure out when will be the next time they are exercising together.
- Find the LCM of 12 and 8.



LCM Word Problem Solution

$$2 \overline{)12}$$

$$2 \overline{)6}$$

$$3 \overline{)3}$$

1

$$2 \overline{)8}$$

$$2 \overline{)4}$$

$$2 \overline{)2}$$

1

$$12 = 2 \times 2 \times 3$$

$$8 = 2 \times 2 \times 2$$

$$\text{LCM} = 2 \times 2 \times 2 \times 3 = 24$$

Ben and Isabel would exercise on the same day every 24 days.



QUIZ!!!!!!

- On a sheet of notebook paper, tell whether the following word problems could be solved using GCF or LCM...
- Also Solve Questions 5 - 8
- Write it out in the KWL format you have just learned.



Question #1

Mrs. Evans has 120 crayons and 30 pieces of paper to give to her students. What is the largest # of students she can have in her class so that each student gets equal # of crayons and equal # of paper.



Question #2

- Rosa is making a game board that is 16 inches by 24 inches. She wants to use square tiles. What is the largest tile she can use?



Question #3

- Z100 gave away a Z \$100 bill for every 100th caller. Every 30th caller received free concert tickets. How many callers must get through before one of them receives *both* a coupon and a concert ticket?



Question #4

- Two bikers are riding a circular path. The first rider completes a round in 12 minutes. The second rider completes a round in 18 minutes. If they both started at the same place and time and go in the same direction, after how many minutes will they meet again at the starting point?



Question #5

Solve the following:

- Sean has 8-inch pieces of toy train track and Ruth has 18-inch pieces of train track. How many of each piece would each child need to build tracks that are equal in length?



Question #6

Solve the following:

- I am planting 50 apple trees and 30 peach trees. I want the same number and type of trees per row. What is the maximum number of trees I can plant per row?



Question # 7

Solve the following:

- Two faucets are dripping. One faucet will drip every 4 seconds and the other faucet drips every 9 seconds. If a drop of water falls from both faucets at the same, how many seconds will it be before you see the faucets drip at the same time again?



Question # 8

Solve the following:

- Three pieces of timber 42 m, 49 m and 63 m long have to be divided into planks of the same length. What is the greatest possible length of each plank ?



QUIZ Answers...

- 1.) GCF
- 2.) GCF
- 3.) LCM
- 4.) LCM
- 5.) LCM – 72 inch train track
- 6.) GCF -10 Rows (5 apple trees, and 3 peach trees per row)
- 7.) LCM – every 36 seconds
- 8.) GCF – 7 m