ADDING AND SUBTRACTING FRACTIONS 8

Name: Key Date:_____ Period:_____

SECTION 8.3 COMMON MULTIPLES AND THE LCM

VOCABULARY

DEFINITION	EXAMPLE
Common multiple: m is a common multiple of a and b if m is a multiple of a and b	36 is a common multiple of 4 and 18
Least Common Multiple (LCM): The smallest common multiple of a and b, LCM(a, b)	LCM(3, 7) = 21

Big Idea: How do we find the least common multiple of a group of numbers?

EXPLORATION 1

Hot dogs usually come in packages of 8 and hot dog buns come in packages of 12.
How many packages of each would you need to purchase to not have any leftover buns or hot dogs?

LCM(8, 12) = 24 3 packs of hot dogs 2 packs of buns

One method of finding the least common multiple is to list all the multiples until you reach the smallest common number.

EXAMPLE 1: List Method

a) Find the LCM of 5 and 7 using the listing method.

5 10 15 20 25 30 35 40 45 ...

7 14 21 28 35 42 49 56 63 ...

LCM(5,7)=35

b) Find the LCM of 10 and 12 using the listing method.

10 20 30 40 50 60 70 80 90 100 110 120 ...

12 24 36 48 60 72 84 96 108 120 132 144 ...

LCM(10,12)=120

EXAMPLE 2: Prime Factorization Method

Find the LCM of 54 and 63 using the prime factorizations below.

$54 = 2 \cdot 3 \cdot 3 \cdot 3 = 2 \cdot 3^3$

$63 = 3 \cdot 3 \cdot 7 = 3^2 \cdot 7$

$2 \cdot 3^3 \cdot 7 = 378$

(largest power of each factor)

$LCM(54, 63) = 378$

Explain how you use the prime factorization method to find the LCM

The LCM needs to have at least one factor of 2, three factors of 3, two factors of 3, and one factor of 7.

PROBLEM 1

Using prime factorizations, find the LCM for m and n without computing the two numbers

$m = 2^3 \cdot 3^5 \cdot 5^1 \cdot 7^2 \cdot \underline{11^3} \cdot 17^2$

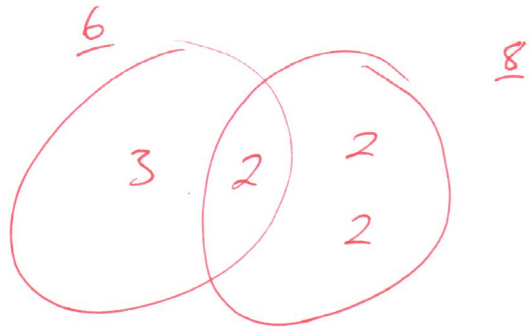
$n = 2^6 \cdot 3^1 \cdot 5^4 \cdot 7^1 \cdot \underline{13^2} \cdot 17$

$LCM(m,n) = 2^6 \cdot 3^5 \cdot 5^4 \cdot 7^2 \cdot 11^3 \cdot 13^2 \cdot 17^2$

EXAMPLE 3: Venn Diagram Method

Find the LCM of 6 and 8 using the Venn diagram method.

2 3 2 4
2 2



$LCM(6,8) = 2\cdot(3)\cdot(2^2) = \boxed{24}$

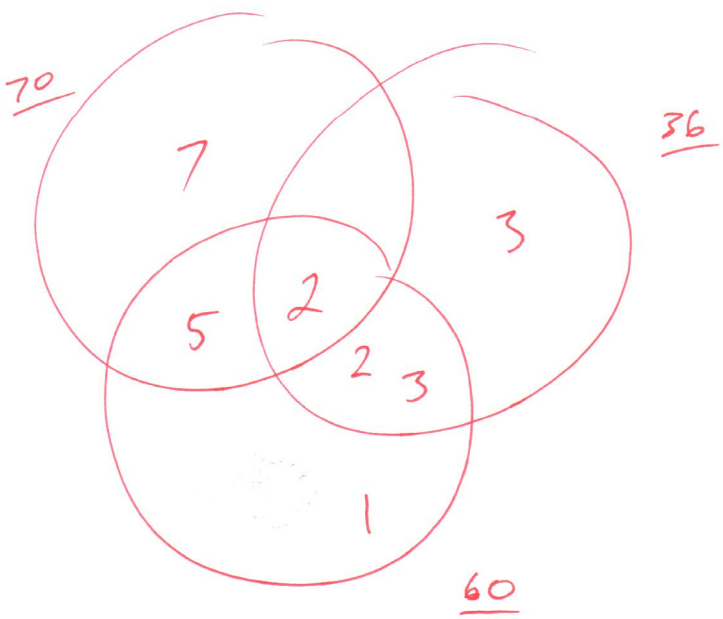
EXAMPLE 4

Find the LCM of 70, 36, and 60 using the Venn diagram method.

10 7
2 5

6 6
2 3 2 3

6 10
2 3 2 5



LCM of 70, 36, and 60 is $2\cdot(2\cdot3)\cdot(5)\cdot(7)\cdot(3)\cdot(1)$
$= \boxed{1260}$

PRACTICE EXERCISES

Find the LCM of the following pairs of numbers using your preferred method. Methods may vary.

a. 8 and 16

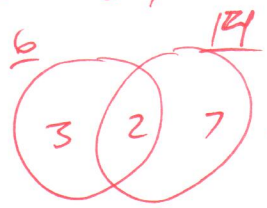
8, 16, 24, ...

16, 32, ...

LCM(8, 16) = 16

b. 6 and 14

2 3 2 7



LCM(6, 14)
$= 2 \cdot 3 \cdot 7$
$= \boxed{42}$

c. 24 and 25

$24 = 2^3 \cdot 3$

$25 = 5^2$

LCM(24, 25) $= 2^3 \cdot 3 \cdot 5^2$

$= \boxed{600}$

d. 10 and 16

$10 = 2 \cdot 5$

$16 = 2 \cdot 2 \cdot 2 \cdot 2 = 2^4$

LCM(10, 16) $= 2^4 \cdot 5$

$= \boxed{80}$

e. 72 and 420

36 2 42 10

6 6 7 6 2 5

2 3 2 3 2 3

$72 = 2^3 \cdot 3^2$

$420 = 2^2 \cdot 3 \cdot 5 \cdot 7$

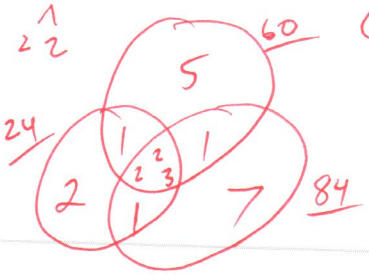
LCM(72, 420)
$= 2^3 \cdot 3^2 \cdot 5 \cdot 7$
$= \boxed{2520}$

f. 24, 60, 84

2 12 6 10

3 4 2 3 2 5

2 2



LCM is
$(2^2 \cdot 3) \cdot 2 \cdot 5 \cdot 7$
$= 2^3 \cdot 3 \cdot 5 \cdot 7$
$= \boxed{840}$

SUMMARY (What I learned today)