NAME_____

Module 4 **Fractions, Decimals, Percents, and Factors**
Lesson 4 **Prime Factorization, GCF, and LCM**

Lesson Notes 4.4

Lesson Objectives

- Use a variety of methods, including prime factorization, to determine the Least Common Multiple (LCM).
- Apply factorization, GCF, and LCM to solve problems.

Subtopic 1 Least Common Multiple

- A **multiple** of a number is the product of the number and a counting number.
- The smallest multiple shared by two or more numbers is the **Least Common Multiple (LCM)**.

Find the LCM.

1. 9 and 15
   9: 9, 18, 27, 36, 45, 54…
   15: 15, 30, 45, 60, 75, …
   LCM = 45

2. 6, 8, and 9
   6: 6, 12, 18, …, 60, 66, 72, …
   8: 8, 16, 24, …, 56, 64, 72, …
   9: 9, 18, 27, …, 54, 63, 72, …
   LCM = 72

Subtopic 2 Using Prime Factorization to Find the LCM

Two ways to find the LCM of a set of numbers:
- Listing the **multiples**
- Using **prime factorization**

To find the LCM using prime factorization:
- List each prime number the **greatest** number of times used.
- **Multiply** those factors.

GCF and LCM
- An LCM is useful when adding and subtracting **fractions** with **unlike denominators** and solving problems.
- A GCF is useful when **simplifying fractions** and solving problems.

Find the LCM.

3 8 and 27

$8 = 2 \times 2 \times 2$

$27 = 3 \times 3 \times 3$

$LCM = 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$LCM = 216$

4 28 and 42

$28 = 2 \times 2 \times 7$

$42 = 2 \times 3 \times 7$

$LCM = 2 \times 2 \times 3 \times 7$

$LCM = 84$

5 12, 16, and 24

$12 = 2 \times 2 \times 3$

$16 = 2 \times 2 \times 2 \times 2$

$24 = 2 \times 2 \times 2 \times 3$

$LCM = 2 \times 2 \times 2 \times 2 \times 3$

$LCM = 48$

Subtopic 3 Applications Using the LCM of More Than Two Numbers

6 Nancy is buying beads to make a necklace. Red beads cost 12 moon dollars each, blue beads cost 36 moon dollars each, and yellow beads cost 52 moon dollars each. Nancy wants to spend an equal amount on each color bead and spend as little as possible. How much will Nancy spend to make her necklace?

$12 = 2 \times 2 \times 3$

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

$52 = 2 \times 2 \times 13$

$LCM = 2 \times 2 \times 3 \times 3 \times 13$

$LCM = 468$

468 moon dollars $\times$ 3

1,404 moon dollars

Subtopic 4 Applications Using the GCF of More Than Two Numbers

- The **Greatest Common Factor (GCF)** is the largest factor two or more numbers share.

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7 Sharon is filling supply boxes for her friends at space camp. She has 20 pencils, 30 pens, and 45 markers. She wants to make as many boxes as possible with the same supplies in each. No supplies can be left over. How many boxes will Sharon fill? How many of each item is in each box?

$20 = 2 \times 2 \times 5$
$30 = 2 \times 3 \times 5$
$45 = 3 \times 3 \times 5$
GCF = 5

- $20 \div 5 = 4$ pencils
- $30 \div 5 = 6$ pens
- $45 \div 5 = 9$ markers

There are five boxes. Four pencils, six pens, and nine markers are in each box for a total of 19 items in each box.

8 Jackie is decorating the gymnasium with flowers for the school dance. She has 32 carnations, 36 roses, and 40 daisies. She wants to make as many identical flower arrangements as possible without any flowers left over. If carnations cost \$1 each, roses cost \$4 each, and daisies cost \$2 each, how much will each flower arrangement cost? How many of each flower is in each arrangement?

$32: \boxed{2} \times \boxed{2} \times 2 \times 2 \times 2$
$36: 2 \times 2 \times 3 \times 3$
$40: 2 \times 2 \times 2 \times 5$
GCF = 4

$32 \div 4 = 8$ carnations: \$1 each
$36 \div 4 = 9$ roses: \$4 each
$40 \div 4 = 10$ daisies: \$2 each

Total cost of each arrangement: $(8 \times \$1) + (9 \times \$4) + (10 \times \$2)$
$\$8 + \$36 + \$20$

The total cost is \$64. There are eight carnations, nine roses, and 10 daisies in each arrangement.