Lesson 2.1: Prime Factors and Their Applications

Specific Outcome: 1.1 – Determine the prime factors of a whole number. 1.2 – Explain why the numbers 0 and 1 have no prime factors. 1.3 – Determine, using a variety of strategies, the greatest common factor or least common multiple of a set of whole numbers, and explain the process. 1.7 – Solve problems that involve prime factors, GCF, and LCM.

PRIME NUMBER:

COMPOSITE NUMBER:

PRIME FACTORIZATION:

Complete the sentences:

The **number 1** is __________ because ____.

The **number 0** is __________ because ____.

PRIME FACTORIZATION

Prime factorize 48: Division Table

Practice: Determine the prime factorization of the following numbers.

a) 224 b) 1764 c) 2250

APPLICATIONS: *GREATEST COMMON FACTOR (GCF)*

Determine the GCF of **90, 225**:

90 **225**

NEXT: find the **product** of each prime factor which is **common** to each prime factorization

GCF: ____

Practice: Use prime factorization to determine the GCF of the following sets of numbers.

a) 48 84 b) 135 162 c) 195 325 312

APPLICATIONS: *LEAST COMMON MULTIPLE*

Determine the LCM of **18, 20**:

18 **20**

NEXT: take all prime factors from first number, and any additional factors from the other numbers, and multiply them together

LCM: ____

Practice: Use prime factorization to determine the LCM of each of the set of numbers given.

a) 126 441 b) 28 30 c) 22 154 198

Problem Solving:

1. What is the side length of the smallest square that could be tiled with rectangles that measure 160 cm by 84 cm? (Assume the rectangles cannot be cut. Sketch the square and rectangle to help in solving.) How many of these rectangles will be needed to fill the square?

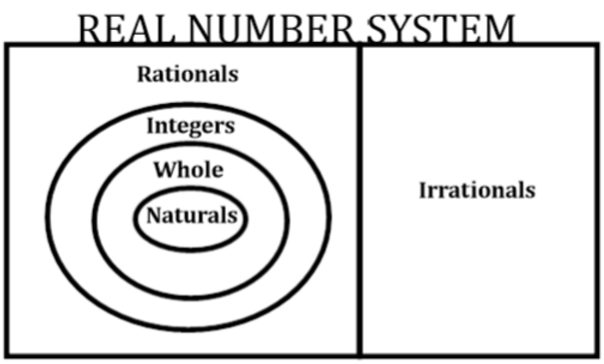
2. What is the side length of the largest square that could be used to tile a rectangle that measure 64 cm by 120 cm? How many of these squares will be needed to tile the rectangle?

HOMEWORK: P. 140 – #9(ac), 11(ac), 12, 13, 15(cf), 16(ef), 17, 20

Lesson 2.2: Real Number System

Specific Outcome: 2.1 – Sort a set of numbers into rational and irrational numbers. 2.3 – Approximate the locations of irrational numbers on a number line, using a variety of strategies, and explain the reasoning. 2.4 – Order a set of irrational numbers on a number line. 2.8 – Represent, using a graphic organizer, the relationship among the subsets of the real numbers (natural, whole, integer, rational, irrational). Enrichment.

REAL NUMBERS: These diagrams show all of the number systems of the real numbers.



NUMBER SYSTEMS OF THE REAL NUMBERS

Natural numbers: **N** = {1, 2, 3, …}

Whole number: **W** = {0, 1, 2, 3, …}

Integers: **I** = {…, -3, -2, -1, 0, 1, 2, 3, …}

Rational numbers: **Q** = { $\frac{a}{b}$ where $a, b \in \mathrm{I}$, $b \neq 0$}

_ = {decimals that terminate or repeat}

Irrational numbers: **Q** = {non-terminating and non-repeating decimals}

Real numbers: **R** = {**Q** and $\overline{\mathbf{Q}}$}

RATIONAL NUMBERS: Q (Gr. 9 Review)

Any number that can be written in the form $\frac{m}{n}$,

$n \neq 0$ where m and n are integers.

Any decimal that terminates or repeats.

Examples: $\frac{29}{11}$, 0.457075, $\sqrt{25} = 5$, 3.1333…

IRRATIONAL NUMBERS: $\overline{\mathbf{Q}}$

A number that can***not*** be written in the form $\frac{m}{n}$.

Any decimal that is non-terminating and non-repeating.

Examples: π, 0.43629381…., $\sqrt{5}$, $\sqrt[3]{9}$

	N	W	I	Q	$\overline{Q}$	R
$1/3$						
123 983						
-2						
$7.53\overline{4}$						
9.5						
$\sqrt{75}$						
$-\pi$						
$-355/113$						
$-\sqrt{49}$						
0.000005						
2.232425...						
$\sqrt{0.16}$						

Practice

1. Identify each number as rational or irrational. Explain your reasoning for each.

a) 43.5 b) 2.145145..... c) $\sqrt{8}$ d) $\frac{-23}{19}$

2. Place a check mark in the columns for which each given number belongs.

Problem Solving

1. Consider the following statements.

i) The set of irrational numbers is nested within the set of rational numbers .
ii) The set of integers contains the set of rational numbers.
iii) The set of whole numbers is nested within the set of natural numbers.
iv) The set of real numbers contains the set of irrational numbers.

Which of the above statements is false?

A. i), ii), and iii) only **B.** i), ii), and iv) only **C.** ii), iii), and iv) only

Answer **D** if all the above statements are false.

2. How many of the numbers $-\sqrt{6}$, $\sqrt{-6}$, $-\sqrt[3]{6}$, $\sqrt[3]{-6}$, do not belong to the real number system?

A. 0 **B.** 1 **C.** 2 **D.** 3

3. How many of the numbers $\sqrt{49}$, $\sqrt{4.9}$, $\sqrt{0.49}$, $\sqrt{\frac{4}{9}}$, can be expressed in the form $\frac{a}{b}$ where $a, b \in N$?

A. 1 **B.** 2 **C.** 3 **D.** 4

4. What is the sum of a rational number and an irrational number?
   A. The sum is always an integer.
   B. The sum is always a rational number.
   C. The sum is always an irrational number.
   D. The sum is impossible to determine.

5. Order the following rational and irrational numbers on a number line.

a) $\sqrt{10}$ b) $-\sqrt{9}$ c) $\frac{29}{19}$ d) $2\sqrt[3]{-2}$ e) $\sqrt[4]{30}$ f) $(0.5)\sqrt{\frac{49}{16}}$

HOMEWORK: P. 211 – 3-7, 9, 12-17, 20, 23