

Lesson 3.1 ~ Prime Factorization

- Prime Factorization: writing a number as the product of its prime factors
- Greatest Common Factor: largest number a set of numbers can be divided by
- Lowest Common Multiple: smallest number that is a multiple of a set of numbers

Example #1: Determine the prime factors of 2646.

$$\begin{array}{c}
 2646 \\
 \wedge \\
 \textcircled{2} \ 1323 \\
 \wedge \\
 \textcircled{3} \ 441 \\
 \wedge \\
 \textcircled{3} \ 147 \\
 \wedge \\
 \textcircled{3} \ 49 \\
 \wedge \\
 \textcircled{7} \ \textcircled{7}
 \end{array}$$

$2646 = 2 \cdot 3^3 \cdot 7^2$

or

$$\begin{array}{c}
 2646 \\
 \wedge \\
 \textcircled{3} \ 882 \\
 \wedge \\
 \textcircled{2} \ 441 \\
 \wedge \\
 \textcircled{7} \ 63 \\
 \wedge \\
 9 \ \textcircled{7} \\
 \wedge \\
 \textcircled{3} \ \textcircled{3}
 \end{array}$$

Example #2: Determine the greatest common factor of 126 and 144.

$$\begin{array}{c}
 126 \\
 \wedge \\
 \textcircled{2} \ 63 \\
 \wedge \\
 9 \ \textcircled{7} \\
 \wedge \\
 \textcircled{3} \ \textcircled{3}
 \end{array}$$

$126 = 2 \cdot 3^2 \cdot 7$

$$\begin{array}{c}
 144 \\
 \wedge \\
 12 \ 12 \\
 \wedge \quad \wedge \\
 \textcircled{3} \ 4 \ \textcircled{2} \ 6 \\
 \wedge \quad \wedge \quad \wedge \\
 \textcircled{2} \ \textcircled{2} \ \textcircled{2} \ \textcircled{3}
 \end{array}$$

$144 = 2^4 \cdot 3^2$

GCF = $2 \times 3 \times 3 = 18$

(LCM = $7 \times 2 \times 3 \times 3 \times 2 \times 2 \times 2 = 1008$)

Example #3: Determine the least common multiple of 28, 42, and 63.

$$\begin{array}{c}
 28 \\
 \wedge \\
 \textcircled{2} \ 14 \\
 \wedge \\
 \textcircled{2} \ \textcircled{7}
 \end{array}$$

$$\begin{array}{c}
 42 \\
 \wedge \\
 \textcircled{2} \ 21 \\
 \wedge \\
 \textcircled{7} \ \textcircled{3}
 \end{array}$$

$$\begin{array}{c}
 63 \\
 \wedge \\
 \textcircled{7} \ 9 \\
 \wedge \\
 \textcircled{3} \ \textcircled{3}
 \end{array}$$

LCM = $2 \times 2 \times 7 \times 3 \times 3 = 252$

(GCF = 7)

Name: _____

Prime Factor Tree

MS2

Draw a prime factor tree for each number.

1) $98 = 2 \times 7^2$

$\begin{array}{c} 2 \wedge \\ 49 \\ \begin{array}{c} 7 \wedge \\ 7 \end{array} \end{array}$

2) $70 = 2 \times 7 \times 5$

$\begin{array}{c} 7 \wedge \\ 10 \\ \begin{array}{c} 2 \wedge \\ 5 \end{array} \end{array}$

3) $84 = 2^2 \times 3 \times 7$

$\begin{array}{c} 4 \wedge \\ 21 \\ \begin{array}{c} 2 \wedge \\ 2 \end{array} \quad \begin{array}{c} 7 \wedge \\ 3 \end{array} \end{array}$

4) $50 = 2 \times 5^2$

$\begin{array}{c} 2 \wedge \\ 25 \\ \begin{array}{c} 5 \wedge \\ 5 \end{array} \end{array}$

5) $44 = 2^2 \times 11$

$\begin{array}{c} 4 \wedge \\ 11 \\ \begin{array}{c} 2 \wedge \\ 2 \end{array} \end{array}$

6) $54 = 2 \times 3^3$

$\begin{array}{c} 6 \wedge \\ 9 \\ \begin{array}{c} 2 \wedge \\ 3 \end{array} \quad \begin{array}{c} 3 \wedge \\ 3 \end{array} \end{array}$

Name : _____

Prime Factor Tree

MS3

Draw a prime factor tree for each number.

