

# 3.1 Factors and Multiples of Whole Numbers

Prime number: a whole number with only two factors, itself and 1

\* The number 1 is not prime.

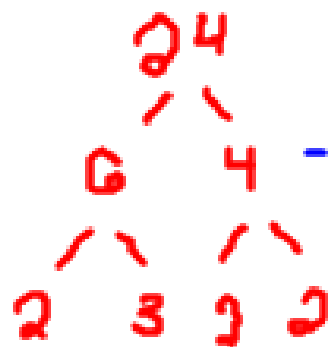
2, 3, 5, 7, 11, 13, 17, ...

Prime Factorization:

writing a number as a product of its prime factors.

ex., find prime factors of 24.

method 1 - Factor Tree



- any two numbers that multiply to 24

$$24 = 2 \cdot 2 \cdot 2 \cdot 3 = 2^3 \cdot 3$$

with powers.

## Method 2 - Use Division of Prime Factors

$$24 \div 2 = 12$$

$$12 \div 2 = 6$$

$$6 \div 2 = 3$$

$$3 \div 3 = 1$$

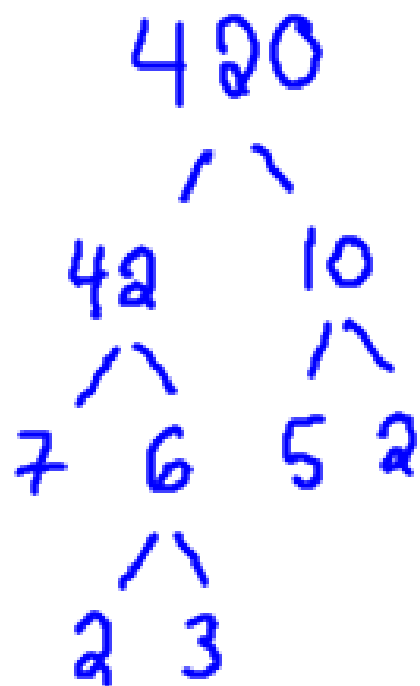
• check smallest prime number (see if it is a factor)

← stop at one!

$$24 = 2 \cdot 2 \cdot 2 \cdot 3$$

$$24 = 2^3 \cdot 3$$

Find prime factorization of 420



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

$$\begin{array}{l} 420 \div 2 = 210 \\ 210 \div 2 = 105 \\ 105 \div 3 = 35 \\ 35 \div 5 = 7 \\ 7 \div 7 = 1 \end{array}$$

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

Try 2646

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$$\begin{array}{l} 2646 \div 2 = 1323 \\ 1323 \div 3 = 441 \\ 441 \div 3 = 147 \\ 147 \div 3 = 49 \\ 49 \div 7 = 7 \\ 7 \div 7 = 1 \end{array}$$

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

Greatest Common Factor (GCF): the greatest number that divides into each number in a set.

ex/1. Find the GCF of 126 and 144

① find prime factors

$$126 \div 2 = 63$$

$$63 \div 3 = 21$$

$$21 \div 3 = 7$$

$$7 \div 7 = 1$$

$$144 \div 2 = 72$$

$$72 \div 2 = 36$$

$$36 \div 2 = 18$$

$$18 \div 2 = 9$$

$$9 \div 3 = 3$$

$$3 \div 3 = 1$$

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

$$144 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$$

② see what is common.

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

GCF of 46 & 84

$$46 \div 2 = 23$$

$$23 \div 23 = 1$$

$$46 = 2 \cdot 23$$

$$\text{GCF} = 2$$

$$84 \div 2 = 42$$

$$42 \div 2 = 21$$

$$21 \div 3 = 7$$

$$7 \div 7 = 1$$

$$84 = 2 \cdot 2 \cdot 3 \cdot 7$$

GCF - 220 & 860

$$220 = 2 \cdot 2 \cdot 5 \cdot 11$$

$$860 = 2 \cdot 2 \cdot 5 \cdot 43$$

$$\text{GCF} = 2 \cdot 2 \cdot 5$$

$$\text{GCF} = 20$$

Least Common Multiple (LCM): the least multiple that is the same for numbers in a set.

ex, Find the LCM of 3, 4, & 6

method 1 - List multiples.

3  $\Rightarrow$  3, 6, 9, 12, 15, 18, 21, 24, 27, ...

4  $\Rightarrow$  4, 8, 12, 16, 20, 24, 28, ...

6  $\Rightarrow$  6, 12, 18, 24, 30, 36, ...

LCM is 12 ...

## Method 2 - Prime Factorization

Find LCM 3, 4, 6

$$3 = \textcircled{3} \quad \leftarrow \text{use all factors in first \#}$$

$$4 = \textcircled{2} \cdot \textcircled{2} \quad \leftarrow \text{take any factors I don't have.}$$

$$6 = 2 \cdot 3 \quad \leftarrow \text{take any factors I don't have.}$$

$$\text{LCM} = 3 \cdot 2 \cdot 2 = 12$$



Find the LCM of 12, 18, 30

HW/

p.140 #3-5

Find the LCM of 28, 42, 63

Do p.140 - #6-14