3.1 Factors and Multiples of Whole Numbers

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

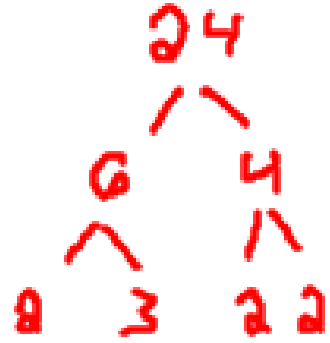
* The number 1 is not prime.

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

Factor Tree. - method 1



- any two numbers that multiply to 24

We write $24 = 2 \cdot 2 \cdot 2 \cdot 3 = 2^3 \cdot 3$ (with powers.)

Method 2 - Division of Prime Factors

24 <- check smallest prime to see if it is a factor.

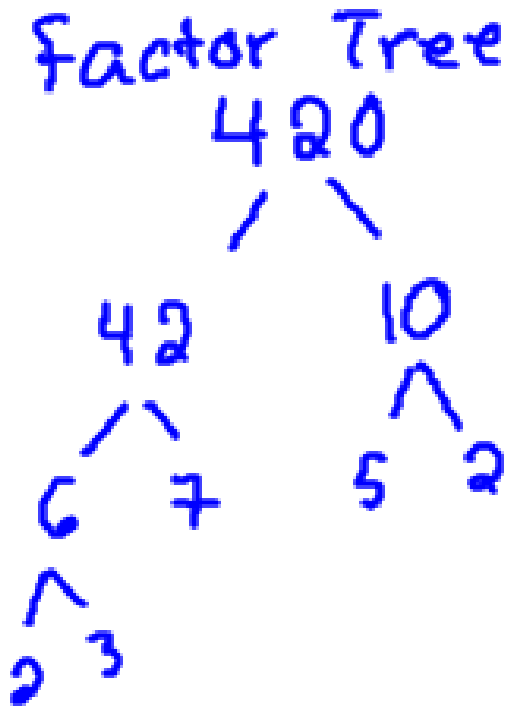
$24 \div 2 = 12$
$12 \div 2 = 6$
$6 \div 2 = 3$
$3 \div 3 = 1$ <- stop at 1

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

$24 = 2^3 \cdot 3$

Find prime factorization of 420

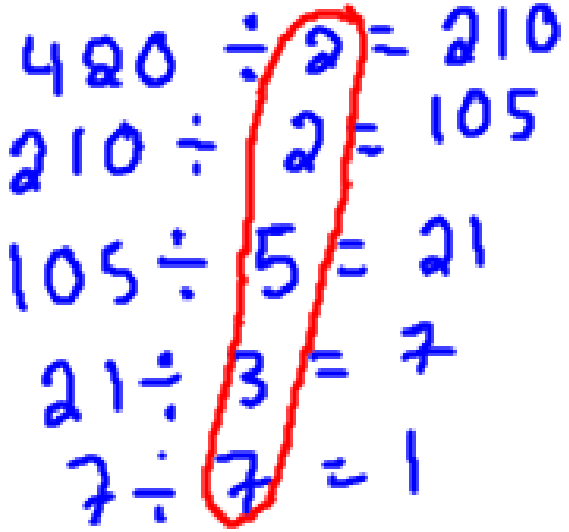
Factor Tree.



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

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

Division.



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

Try 2646

2646

$2646 \div 2 = 1323$

$1323 \div 3 = 441$

$441 \div 3 = 147$

$147 \div 3 = 49$

$49 \div 7 = 7$

$7 \div 7 = 1$

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

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

Find the GCF of 126 and 144.

- break down numbers into prime factors.

$126 \div 2 = 63$
$63 \div 3 = 21$
$21 \div 3 = 7$
$7 \div 7 = 1$

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

$144 \div 2 = 72$
$72 \div 2 = 36$
$36 \div 2 = 18$
$18 \div 2 = 9$
$9 \div 3 = 3$
$3 \div 3 = 1$

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

$GCF = 2 \cdot 3 \cdot 3 = 18$

ex 1)

GCF of 46 & 84

$46 \div 2 = 23$

$23 \div 23 = 1$

$46 = 2 \cdot 23$

$84 \div 2 = 42$

$42 \div 2 = 21$

$21 \div 3 = 7$

$7 \div 7 = 1$

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

GCF = 2

GCF of 220 & 860

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

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

GCF = $2 \cdot 2 \cdot 5 = 20$

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

Find the LCM of 3, 4, 6

method 1 - List multiples

3 => 3, 6, 9, (12), 15, 18, 21, 24, 27, ...

4 => 4, 8, (12), 16, 20, 24, 28, ...

6 => 6, (12), 18, 24, 30, ...

LCM = 12

method 2 - Prime factorization.

3, 4, 6

$3 = (3)$ <- use all factors in first #

$4 = (2 \cdot 2)$ <- take any factors that I don't have.

$6 = 2 \cdot 3$ <- take any factors that I don't have.

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

Find the LCM of 12, 18, 30

HW/ p. 140 #3-5

Find the LCM of 28, 42, 63

Do p.140 - #6-14