PRINCIPLES - LESSON 12A
PRIME FACTORIZATION

PRIME NUMBER: a number with exactly 2 positive factors (1 and itself)

From our definition, why is the number 1 NOT a prime number?

The number 1 has only one positive factor. (itself)

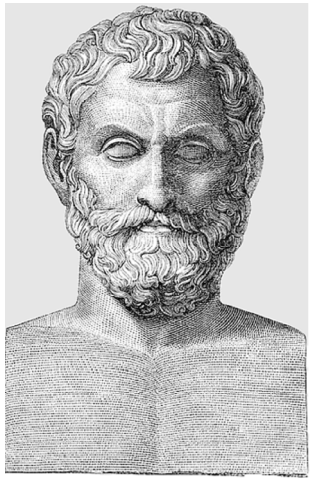
What makes the number 2 unique as a prime number?

The number 2 is the first and only even prime number.

What do we call numbers that have more than 2 factors?

Numbers with more than 2 factors are called **COMPOSITE NUMBERS**.

THE SIEVE OF ERATOSTHENES



ERATOSTHENES OF CYRENE (276 B.C. - 194 B.C.)

ancient mathematician, geographer, poet, astromer,
music theorist, and chief librarian of the Library of Alexandria

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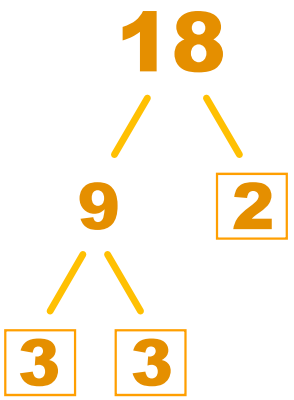
SIEVE OF ERATOSTHENES

PRIME FACTORIZATION

PRIME FACTORIZATION: every composite number can be written as a unique product of prime numbers

In this way, prime numbers are the building blocks for all other numbers.

ex1) Find the prime factorization of 18.

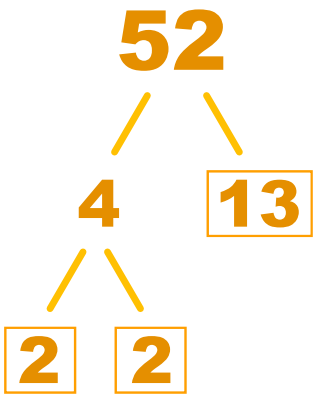


$= 2 \cdot 3 \cdot 3$

$= \boxed{2 \cdot 3^2}$

PRIME FACTORIZATION

ex2) Find the prime factorization of 52.

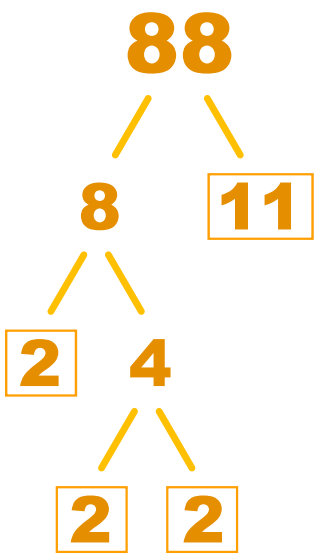


$= 2 \cdot 2 \cdot 13$

$= \boxed{2^2 \cdot 13}$

PRIME FACTORIZATION

ex3) Find the prime factorization of 88.



$= 2 \cdot 2 \cdot 2 \cdot 11$

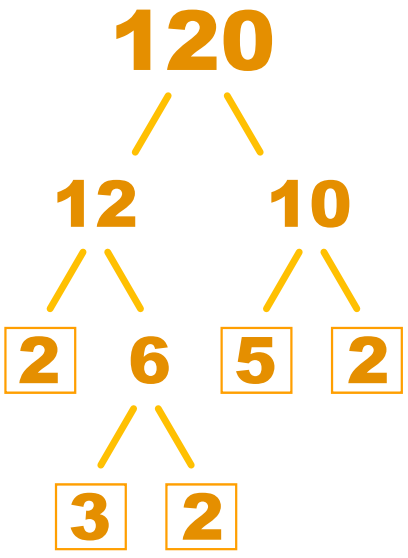
$= \boxed{2^3 \cdot 11}$

DIVISIBILITY RULES

A number is divisible by 2 if	the last digit is divisible by 2
A number is divisible by 3 if	the sum of the digits is divisible by 3
A number is divisible by 4 if	the last 2 digits are divisible by 4
A number is divisible by 5 if	the last digit is 0 or 5
A number is divisible by 6 if	it is divisible by both 2 and 3
A number is divisible by 7 if	your calculator says so
A number is divisible by 8 if	the last 3 digits are divisible by 8
A number is divisible by 9 if	the sum of the digits is divisible by 9
A number is divisible by 10 if	the last digit is zero

PRIME FACTORIZATION

ex4) Find the prime factorization of 120.

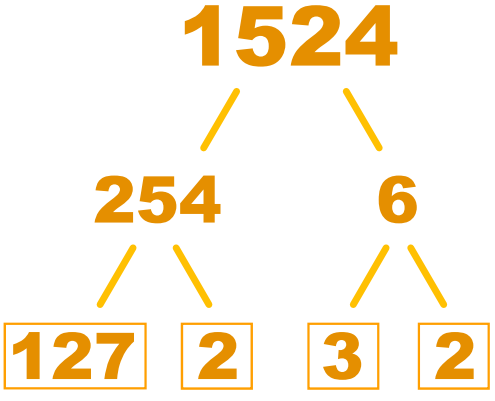


$120 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

$= \boxed{2^3 \cdot 3 \cdot 5}$

PRIME FACTORIZATION

ex5) Find the prime factorization of 1524.



$1524 = 2 \cdot 2 \cdot 3 \cdot 127$

$= \boxed{2^2 \cdot 3 \cdot 127}$

PRIME FACTORIZATION

ex6) Find the prime factorization of 227.

227 is a prime number.

PRIME FACTORIZATION

You must check all prime numbers up to the

SQUARE ROOT

of the number for divisibility.