

Lesson 9

Prime Numbers

Terms

- Composite numbers
- Divisible
- Prime factorization
- Prime numbers

Prime Numbers

- are counting numbers greater than 1 that have exactly two different counting number factors
- 2, 3, 5, 7, 11, and 13 are prime arrays for which no other array can be made

Composite Numbers

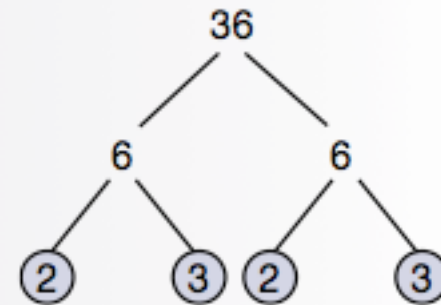
- Counting numbers with more than two factors
- 4, 8, 9, 10, and 12

Prime Factorization

- We write the prime factorization of a composite number by writing the number as a product of prime numbers.
- The prime factorization of 6 is $2 \cdot 3$.

Factor Tree

- a. A factor tree can help us find the prime factorization of a number. Here we show one possible factor tree for 36. We split 36 into the factors 6 and 6. Then we split each 6 into the factors 2 and 3. We stop when the factors are prime; we do not use the number 1 in a factor tree. We order the prime numbers at the end of the “branches” to write the prime factorization.



$$36 = 2 \cdot 2 \cdot 3 \cdot 3$$

by Division

- b.** Another method for finding the prime factorization of a number is by dividing the number by a prime number and then dividing the quotient by a prime number. We continue dividing in this way until the quotient is prime.

$$\begin{array}{r} 3 \\ 3 \overline{)9} \\ 5 \overline{)45} \end{array}$$

We use the divisors, 5 and 3, and the final quotient, 3, to write the prime factorization.

$$45 = 3 \cdot 3 \cdot 5$$

Divisibility

- If a number is prime it is not evenly divisible by any counting numbers other than one
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Divisibility Tests

Divisibility Tests

Condition	Number is Divisible by	Example Using 3420
the number is even (ends with 0, 2, 4, 6, or 8)	2	342 <u>0</u>
the sum of the digits is divisible by 3	3	$3 + 4 + 2 + 0 = 9$ and 9 is divisible by 3
the number ends in 0 or 5	5	342 <u>0</u>

Example

Determine whether the following numbers are prime or composite and state how you know.

a. 1,237,526

b. 520,611

olution

a. The number is **composite** because it is even and thus divisible by 2.

b. The number is **composite** because the sum of its digits is divisible by 3 ($5 + 2 + 0 + 6 + 1 + 1 = \underline{15}$).

Work

- When you are done with the letters
- put the sheet in the basket in the window