

Introducing prime factor trees

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Christian Goldbach

Born: 18 March 1690 in Königsberg, Prussia (now Kaliningrad, Russia)

Died: 20 Nov 1764 in Moscow, Russia

The mathematician Goldbach said that all even numbers above 2 can be written as the sum of two primes:

e.g. $12 = 5 + 7$

List the five distinct ways in which 48 can be expressed as the sum of two primes.

Answers

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Each integer can also be written as the product of primes. This was discovered by the Greek mathematician Euclid.

Primes are the building blocks for all natural numbers:

e.g. $9 = 3 \times 3$
 $38 = 2 \times 19$
 $45 = 3 \times 3 \times 5$



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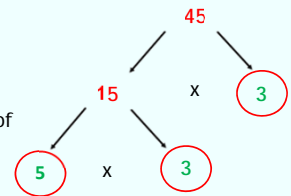
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3

Breaking a number into the product of its primes is called prime factor decomposition.

We use prime factor trees to help us:

1. Find two numbers that multiply to give your original number. One of the numbers must be prime.
2. Circle the prime number.
3. Repeat until all branches of the tree end with circled prime numbers.

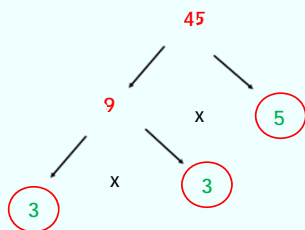


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It doesn't matter what order you find the primes in:



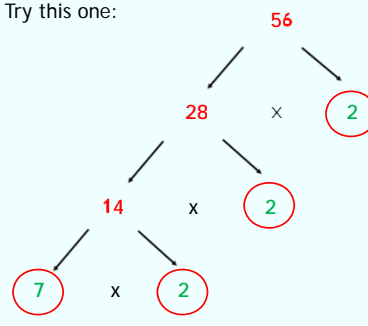
$45 =$

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Try this one:



$56 =$

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6

Express each of the following as the product of primes:

50

30

105

52

63

81



Primes less than 100:
2, 3, 5, 7, 11, 13, 17, 19,
23, 29, 31, 37, 41, 43, 47,
53, 59, 61, 67, 71, 73, 79,
83, 89, 97.