

Factor trees, HCF, LCM

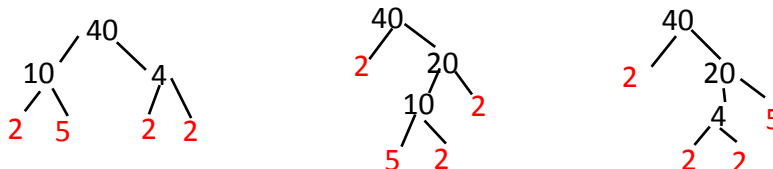
We can break any number down into its prime factors. The easiest way to do this is by drawing a factor tree.

Start with the number, and then branch it out into any pair of factors.

If any of those factors is not a prime factor, then it will break down into smaller factors.

Break down every branch until all that remains is prime numbers.

Whatever pair of factors you start with, you will always end up with the same prime factors at the end.



We can simplify our answer by remembering that 2×2 can be written as 2^2

This means that $5 \times 2 \times 2 \times 2$ can be written as 5×2^3 .

Highest Common Factor (HCF)

The Highest Common Factor (HCF) of two numbers is the biggest number that is a factor of both of them.

20 has **factors** 1, 2, 4, 5.

12 has **factors** 1, 2, 3, 4, 6.

They have factors 1, 2 and 4 in common. **4 is the highest, so it is called the HCF.**

Listing out the factors and looking for the highest one in both lists is one way of finding the HCF, and works well with smaller numbers.

Another way to find it is by breaking down both numbers into factor trees.

20 has prime factors $2 \times 2 \times 5$. 12 has factors $2 \times 2 \times 3$. They both contain 2×2 , so 2×2 is the HCF.

4 is the **highest number that is a factor of both.**

Least Common Multiple (LCM)

The Least Common Multiple (LCM) of two numbers is the smallest number that is a multiple of both of them.

4 has **multiples** 8, 12, 16, 20, 24...

6 has **multiples** of 12, 18, 24, 32...

12 is the smallest number that is a multiple of both.

Another way to find it is by breaking down both numbers into factor trees and combining the factors.

4 has factors 2×2 . 6 has factors 2×3 . The smallest set that contains all factors from both is $2 \times 2 \times 3$.

Now you try.

1. Draw factor trees for these numbers.

12

45

32

2. Draw factor trees for these numbers.

20

30

What is their highest common factor?

3. Draw factor trees for these numbers.

15

25

Write out the first few multiples of each number.

What is their least common multiple?