

Prime factors, LCM and GCF on the FX82AU+II.

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Prime Factorisation

Prime factorisation is a way of writing a composite number as a product of prime numbers. Using this can assist in finding the Greatest Common Divisor (or Factor) (**GCD** or **GCF**) and the Least Common Multiple (**LCM**) of a number. Many real world problems use **GCF** or **LCM** and prime factorisation of numbers.

Finding prime factorization problems

Find the prime factorisation of the numbers 32 and 96.

Using the [SHIFT], then [\circ ' "].



Enter in 100, then press [=], then [SHIFT], then [\circ ' "'] to get the result $100 = 2^2 \times 5^2$ (See below.).



Similarly for 34.



The prime factorisation can be done in quick, easy steps on the FX82AU+II.

GCD Problems and LCM Problems

The greatest common factor (**GCF**) or the greatest common divisor (**GCD**) of two or more numbers is the product of all the **common factors** of the numbers. To find the common factors, the prime factorisation of each number is used.

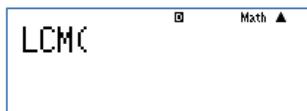
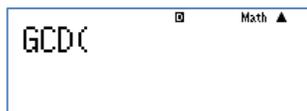
The lowest common multiple of two or more numbers can be found by picking the common multiple (**LCM**). The **LCM** of two numbers, are the common factors (**GCD**) left out in the prime factorization and found by multiplying the **GCD** with these.

Both of these commands are accessed via:

[ALPHA] [×] for **GCD**(

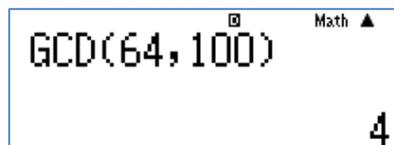


and [ALPHA] [÷] for **LCM**(

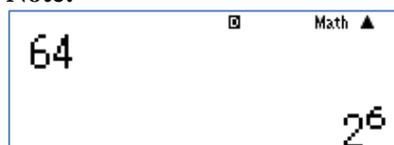


There are many problem situations which require the **GCD** or **LCM** of numbers to be found. These problems are solved writing the prime factorisation of numbers involved.

Find the greatest common divisor of the numbers 64 and 100.



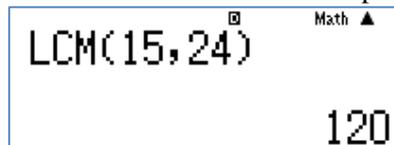
Note:



The prime factorization of the numbers 64 and 100 are:

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \quad \text{and} \quad 100 = 2 \times 2 \times 5 \times 5$$

Find the Least Common Multiple of the numbers 15 and 24.



Note:



The prime factorization of the numbers 15 and 24 are:

$$15 = 3 \times 5 \quad \text{and} \quad 24 = 2 \times 2 \times 2 \times 3$$

$$\text{Hence the LCM of 15 and 24} = \text{GCD} \times 2 \times 2 \times 2 \times 5 = 3 \times 40 = 120.$$



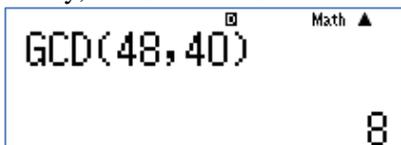
Example 1:

A combined class of Y11, 12 and 13 students was assembled for a Mathematics class. The teachers seated the students in the order of year level and seating the same number of students in each row. If there were 48 Year 11's, 40 Year 12's and 32 Year 13's present, how many students were seated in a row?

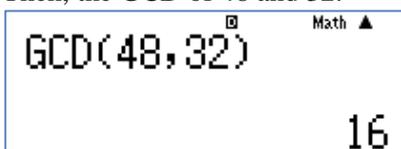
Answer:

The number of students seated in a row should divide the number of students in each year level. This means the greatest common divisor of numbers 48, 40 and 32 needs to be found.

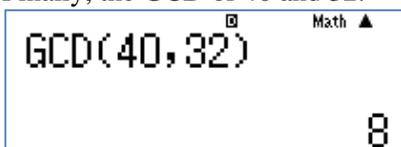
So, writing the prime factorisation of these three numbers: Firstly, the GCD of 48 and 40.



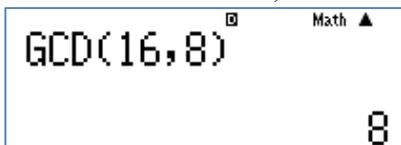
Then, the GCD of 48 and 32.



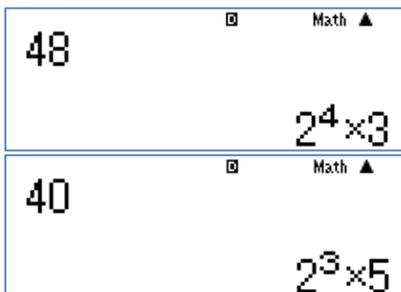
Finally, the GCD of 40 and 32.



Now, find the GCD of 16 and 8, which will be the GCD of these three numbers 48, 40 and 32.



Note:



The prime factorization of the numbers 48, 40 and 32 are:

$48 = 2 \times 2 \times 2 \times 2 \times 3$

$40 = 2 \times 2 \times 2 \times 5$

$32 = 2 \times 2 \times 2 \times 2 \times 2$

Hence the greatest common factor = $2 \times 2 \times 2 = 8$.

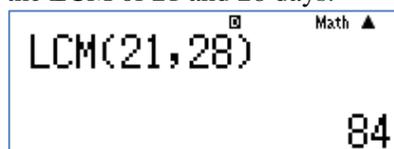
So, 8 students were seated in each row.

Example 2:

Jane visits her Aunt Pania once in 21 days and Uncle Tama once in 28 days. Today she visited both of them. When will she be visiting both Aunt Mary and Uncle John again on the same day?

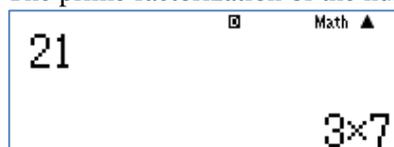
Answer:

The coincidence of the visits to both the Aunty and Uncle will occur at intervals, where the length of time is equal to the LCM of 21 and 28 days.



Note:

The prime factorization of the numbers 21 and 28 are:



The prime factorization of the numbers 48, 40 and 32 are:

$21 = 3 \times 7$

$28 = 2 \times 2 \times 7$

7 is the common factor, the **GCD** of 21 and 28 = 7

Hence the **LCM** of 21 and 28 = $\text{GCD} \times 2 \times 2 \times 3$

$= 7 \times 12 = 84$.

Jane will make the two visits on the same day after the 84th day.

Web links:

https://en.wikipedia.org/wiki/Greatest_common_divisor

https://en.wikipedia.org/wiki/Least_common_multiple