

NUMBER THEORY: DIVISORS

1. DIVISORS

Remember grade school and finding the factors of integers? Well, here's a review.

Notes

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Fundamental Theorem of Arithmetic

Any integer greater than 1 can be written as a product of primes.

From Discrete Mathematics by Johnsonbaugh, p 227

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Example:

$$30 = ?$$

$$100 = ?$$

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Example:

$$30 = 2 \times 3 \times 5$$

$$100 = 5 \times 5 \times 2 \times 2$$

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A **Common Divisor** of two integers m and n is an integer that divides both m and n .

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Example: What are the common divisors between 30 and 105?

$$30 = ?$$

$$105 = ?$$

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$$30 = \underline{1}, \underline{2}, \underline{3}, \underline{5}, 6, 10, \underline{15}, 30.$$

$$105 = \underline{1}, \underline{3}, \underline{5}, 7, \underline{15}, 21, 35, 105.$$

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The **Greatest Common Divisor** of two integers m and n , written $\gcd(m, n)$, is the largest positive integer that divides both m and n .

$$30 = 1, 2, 3, 5, 6, 10, 15, 30.$$

$$105 = 1, 3, 5, 7, 15, 21, 35, 105.$$

What is $\gcd(30, 105)$?

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What is $\gcd(30, 105)$? **15**

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The **Least Common Multiple** of m and n , $\text{lcm}(m, n)$ is an integer that is divisible by both m and n that is the smallest positive common multiple of both.

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What is $\text{lcm}(30, 105)$?

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The **Least Common Multiple** of m and n , $\text{lcm}(m, n)$ is an integer that is divisible by both m and n that is the smallest positive common multiple of both.

What is $\text{lcm}(30, 105)$?

Prime factors of $30 = 2 \times 3 \times 5$

Prime factors of $105 = 5 \times 3 \times 7$

$\text{lcm}(30, 105) = 2 \times 3 \times 5 \times 7 = 210$

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CONCLUSION

Yay.