

June 23, 2015

$$A = \{ a, b \}$$

$\emptyset, \{a\}, \{b\}, \{a, b\}$

$\uparrow \quad \uparrow \quad \uparrow \quad \uparrow$

Proper Subsets itself
Not P!

$$A \subseteq B \ \& \ A \neq B$$

Jun 23-11:07 AM

Chapter 6 - Number Theory

Set of Natural Numbers

$$\{1, 2, 3, \dots\}$$

Counting Numbers

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$12 = 3 \cdot 4$ multiplication

\uparrow
 a Product of 3 & 4

$\uparrow \quad \uparrow$
 are Factors (or Divisors) of 12

$4 \mid 12$

4 divides 12 what is our "g"?
 $12 = 4 \cdot 3$

Def: "a divides b", written as $a \mid b$, provided there is a "g" such that $b = g \cdot a$

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Prime $\rightarrow 7 = 1 \cdot 7$ $7 = 7 \cdot 1$

Therefore, $7 \mid 7 = 1$

Composite $\rightarrow 6 = 1 \cdot 6 \Rightarrow 6 \mid 6 = 1$

\uparrow
 $2 \cdot 3$
 $\uparrow \quad \uparrow$
 $2 = 2 \cdot 1 \quad 3 = 3 \cdot 1$

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a Prime number is a number whose only factors are itself and one. Building Blocks

a Composite number is a number composed of factors of Prime numbers.

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$8 = 4 \cdot 2$ factors of 8, but not prime

$= 2 \cdot 2 \cdot 2 = 2^3$

Prime factors of 8

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19

Prime
or
Composite

{1, 2, 3, ..., 19}

$1 \mid 19 = 19$

$2 \mid 19 = 2 \overline{) 19} \begin{array}{r} 9 \\ 18 \\ \hline 1 \end{array} \Rightarrow 19 = 2 \cdot 9 + 1$

$3 \mid 19 = 3 \overline{) 19} \begin{array}{r} 6 \\ 18 \\ \hline 1 \end{array}$

\vdots

$19 \mid 19 = 1$

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$\sqrt{16} = 4$
 $4^2 = 16$

$\sqrt{19}$
 $4 \cdot \dots$
 $(?)^2 = 19$

$\sqrt{25} = 5$
 $5^2 = 25$

Prime = {2, 3, 5, 7, 11, 13, 17, 19, 23, ...}

only Even Prime!

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$\frac{\text{Smiley Face}}{1} = \text{Smiley Face}$

Jun 23-12:03 PM

Write as a Product of Primes

$42 = 2 \cdot 3 \cdot 7$

Factor Tree

21 ← Composite

2, 3, 7

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$126 = 2 \cdot 3 \cdot 3 \cdot 7$
 $= 2 \cdot 3^2 \cdot 7$

Factor Tree:

126 → 2 · 63 → 2 · 3 · 21 → 2 · 3 · 3 · 7

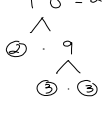

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$1560 = 2^3 \cdot 3 \cdot 5 \cdot 13$

Factor Tree:

1560 → 2 · 780 → 2 · 2 · 390 → 2 · 2 · 2 · 195 → 2 · 2 · 2 · 3 · 65 → 2 · 2 · 2 · 3 · 5 · 13

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$18 = 2 \cdot 3 \cdot 3$ $46 = 2 \cdot 23$



$18 = 2 \cdot 3 \cdot 3$
 $46 = 2 \cdot 23$

↑
 Common factors of 18 & 46

2 Greatest Common Factor
 of 18 & 46 (Divisor)
 GCF or GCD

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