Notation Cheat Sheet

1. $+$ Addition
2. $-$ Subtraction
3. $\times, \cdot$ Multiplication
4. $\div, /$ Division
5. $\mathbb{N} = \{1, 2, 3, ...\}$ Natural Numbers
6. $\mathbb{Z}$ Integers (Zählen)
7. $\mathbb{Q}$ Rational Numbers (Quoziente)
8. $\mathbb{R}$ Real Numbers
9. $\neg$ Not, Negation
10. $\vee$ Or
11. $\wedge$ And
12. $\equiv$ Logically Equivalent (Later: Congruences)
13. $|$ Divides
14. $\Rightarrow$ Implies (If... Then)
15. $\Leftrightarrow$, (iff) If and Only If
16. $\in$ In
17. $\notin$ Not In
18. $\{\}, \emptyset$ Empty Set
19. $\cap$ Intersection (Of Sets)
20. $\cup$ Union (Of Sets)
21. $S^c, \bar{S}$ Set Complement (With Respect to a Universe U)
22. $S - T$ Set Difference
23. $S \times T$ Cartesian Product
24. $\subset$ Subset
25. $\subseteq$ Subset Or Equal
26. $\subsetneq$ Proper/Strict Subset (Subset Not Equal)
27. $\supset$ Contains

28. $\supseteq$ Contains Or Equal
29. $\supsetneq$ Properly/Strictly Contains (Contains Not Equal)
30. $\forall$ For All
31. $\exists$ There Exists
32. $\exists!$ There Exists a Unique
33. $\exists^\infty$ There Exists Infinitely Many
34. $\#$ A contradiction
35. $\therefore$ Therefore
36. $\because$ Since (or Because)
37. BWOC By Way of Contradiction
38. WLOG Without Loss of Generality
39. $$\begin{aligned} f : \mathbb{R} &\to \mathbb{N} \\ x &\mapsto \lfloor x \rfloor \end{aligned}$$

    Here, f is a function from the real numbers to the natural numbers defined by sending x to the floor of x, that is, $f(x) = \lfloor x \rfloor$ (floor here means drop the decimal).
40. $\hookrightarrow$ Injects
41. $\twoheadrightarrow$ Surjects
42. $\displaystyle\sum_{i=1}^{n} a_n = a_1 + a_2 + ... + a_n$ Summation
43. $\displaystyle\sum_{i=1}^{0} a_n = \sum_{x \in \emptyset} x = 0$ Empty Sum
44. $\displaystyle\prod_{i=1}^{n} a_n = a_1 \cdot a_2 \cdot ... \cdot a_n$ Product
45. $\displaystyle\prod_{i=1}^{0} a_n = \prod_{x \in \emptyset} x = 1$ Empty Product
46. $\gcd(a, b)$ Greatest Common Divisor of a and b
47. $\operatorname{lcm}(a, b)$ Least Common Multiple of a and b.
48. LDE Linear Diophantine Equations (Seeking integer solutions to an equations over the integers).

49. $a \equiv b \mod m$ a is congruent to b modulo m, $m \mid (a-b)$.

50. $:=$ Defined To Be (Is Defined As)

51. $[a] = \{x \in \mathbb{Z} : x \equiv a \mod m\}$.

52. $\mathbb{Z}/m\mathbb{Z} = \mathbb{Z}_m = \{[0], [1], ..., [m-1]\}$, Integers Modulo m.