Number System Cheat Sheet

Concept	Definition / Rule
Rational Number	Can be written as p/q where p, q are integers and q ≠ 0
Irrational Number	Cannot be written as p/q; decimal never ends or repeats
Terminating Decimal	Decimal that ends (e.g., 0.75, 1.2)
Recurring Decimal	Decimal that repeats forever (e.g., 0.333...)
Real Number	Includes both rational and irrational numbers
Binary Operation	Operation that takes 2 inputs and returns a result from same set
Addition Closure	a + b is a real number
Addition Commutative	a + b = b + a
Addition Associative	(a + b) + c = a + (b + c)
Additive Identity	a + 0 = a
Multiplication Closure	a × b is a real number
Multiplication Commutative	a × b = b × a
Multiplication Associative	(a × b) × c = a × (b × c)
Multiplicative Identity	a × 1 = a
Multiplicative Inverse	a × (1/a) = 1, a ≠ 0
Distributive Property	a(b + c) = ab + ac
Reflexive Property	a = a
Symmetric Property	If a = b, then b = a
Transitive Property	If a = b and b = c, then a = c
Additive Property of Equality	If a = b, then a + c = b + c
Multiplicative Property of Equality	If a = b, then a × c = b × c
Trichotomy of Inequality	Exactly one is true: a = b, a > b, a < b
Transitive Inequality	If a > b and b > c, then a > c
Additive Inequality	If a > b, then a + c > b + c
Multiplicative Inequality (>0)	If a > b and c > 0, then ac > bc
Multiplicative Inequality (<0)	If a > b and c < 0, then ac < bc