

Foundational math

- ✓ Multiplication and division rules:
 - Multiplying or dividing by 1 leaves the number unchanged
 - Multiplying any number by zero gives zero
 - Zero divided by a nonzero number is zero: $0/K$, zero on top is OK
 - Dividing by zero is undefined: $N/0$, zero on the bottom is No
- ✓ Fractions:
 - $\frac{\text{part}}{\text{whole}}$
 - Multiply: straight across
 - Add or subtract: denominators must match
 - Divide: keep, change, flip
- ✓ Order of operations (PEMDAS):
 - P: parentheses
 - E: exponents
 - M & D: multiplication and division, left to right
 - A & S: addition and subtraction, left to right
- ✓ Inequalities:
 - Less than: $<$
 - Less than or equal to: $\leq$
 - Greater than: $>$
 - Greater than or equal to: $\geq$

÷ Pre-algebra

- ✓ Long division steps:
 - Divide
 - Multiply
 - Subtract
 - Bring down
- ✓ Improper fraction: the numerator is greater than or equal to the denominator

X¹ Algebra

- ✓ Absolute value:
 - The distance a number is from zero, so $|x| \geq 0$
 - $|x| = a$ with $a > 0$ has **two** solutions: $x = a$ or $x = -a$
- ✓ Proportions:
 - Ratios that are equal
 - Solve by cross-multiplication

Exponent rules

Name	Rule	Example
Zero exponent	$a^0 = 1$ ($a \neq 0$)	$2^0 = 1$
Product	$a^b \cdot a^c = a^{b+c}$	$2^3 \cdot 2^4 = 2^7$
Quotient	$\frac{a^b}{a^c} = a^{b-c}$	$\frac{2^4}{2^3} = 2^1$
Power of a power	$(a^b)^c = a^{bc}$	$(2^4)^3 = 2^{12}$
Power of a product	$(ab)^c = a^c b^c$	$(2b)^3 = 2^3 b^3$
Negative exponent	$a^{-b} = \frac{1}{a^b}$	$2^{-3} = \frac{1}{2^3}$

√x Roots

- ✓ Roots as exponents: $\sqrt[n]{a^b} = a^{b/n}$
- ✓ Square roots to memorize:
 - $\sqrt{1} = 1$
 - $\sqrt{4} = 2$
 - $\sqrt{9} = 3$
 - $\sqrt{16} = 4$
 - $\sqrt{25} = 5$
 - $\sqrt{36} = 6$
 - $\sqrt{49} = 7$
 - $\sqrt{64} = 8$
 - $\sqrt{81} = 9$
 - $\sqrt{100} = 10$
 - $\sqrt{121} = 11$
 - $\sqrt{144} = 12$
- ✓ Cube roots to memorize:
 - $\sqrt[3]{1} = 1$
 - $\sqrt[3]{8} = 2$
 - $\sqrt[3]{27} = 3$
 - $\sqrt[3]{64} = 4$
 - $\sqrt[3]{125} = 5$