

Algebra I formula sheet

Key formulas and reminders. Use only teacher-authorized materials during assessments.

LINES

$m = (y_2 - y_1)/(x_2 - x_1)$, $x_2 \neq x_1$
 $y = mx + b$; $y - y_1 = m(x - x_1)$
 $Ax + By = C$; direct variation: $y = kx$
 Parallel nonvertical lines: same slope.
 Perpendicular nonvertical lines: $m_1 m_2 = -1$.
 Horizontal: $y = k$. Vertical: $x = k$.

EQUATIONS, SYSTEMS & INEQUALITIES

Apply the same valid operation to both sides.
 $AB = 0$ means $A = 0$ or $B = 0$.
 A system solution satisfies every equation.
 Multiply/divide an inequality by a negative number: **reverse the inequality sign**.
 Graph: $\leq$ or $\geq$ solid; $<$ or $>$ dashed.
 Test a point to choose the shaded side.

EXPONENTS & ROOTS

$a^m a^n = a^{m+n}$; $a^m / a^n = a^{m-n}$
 $(a^m)^n = a^{mn}$; $(ab)^n = a^n b^n$
 $a^0 = 1$; $a^{-n} = 1/a^n$, with $a \neq 0$.
 Integer powers; every denominator $\neq 0$.
 For $a > 0$: $a^{m/n} = (\text{the } n\text{th root of } a)^m$.
 m integer, n positive integer.
 For real x : $\sqrt{x^2} = |x|$.

POLYNOMIALS & FACTORING

Take out a greatest common factor first.
 $(x + p)(x + q) = x^2 + (p + q)x + pq$
 $(a + b)^2 = a^2 + 2ab + b^2$
 $(a - b)^2 = a^2 - 2ab + b^2$
 $a^2 - b^2 = (a - b)(a + b)$
 Keep original denominator restrictions when simplifying a quotient.

QUADRATICS

$f(x) = ax^2 + bx + c = a(x - h)^2 + k$, $a \neq 0$
 Vertex: (h, k) ; $h = -b/(2a)$, $k = f(h)$
 For $ax^2 + bx + c = 0$:
 $x = [-b \pm \sqrt{b^2 - 4ac}] / (2a)$
 $D = b^2 - 4ac$: $D > 0$ two real roots;
 $D = 0$ one repeated real root; $D < 0$ none.
 $(x - h)^2 = k \geq 0$ gives $x = h \pm \sqrt{k}$.

FUNCTION TRANSFORMATIONS

$f(x - h) + k$ shifts by h horizontally and k vertically: positive h right, positive k up.
 $af(x)$: vertical scale $|a|$; reflect across the x -axis if $a < 0$.
 $f(bx)$: horizontal scale $1/|b|$; reflect across the y -axis if $b < 0$ ($a, b \neq 0$).
 After restricting inputs, recheck the range.

SEQUENCES: FIRST INDEX $n = 1$

Arithmetic: $a_n = a_1 + (n - 1)d$
 Recursive: $a_n = a_{n-1} + d$
 Geometric: $a_n = a_1 r^{n-1}$
 Recursive: $a_n = r a_{n-1}$
 State a_1 with either recursive rule.
 Explicit rules: $n = 1, 2, \dots$
 Recursive steps: $n = 2, 3, \dots$

EXPONENTIAL MODELS

$f(t) = ab^t$: $a = f(0)$, $b = \text{multiplier}$.
 Nonconstant case: $a \neq 0$, $b > 0$, $b \neq 1$.
 For positive amounts and decimal rate r :
 growth $b = 1 + r$; decay $b = 1 - r$.
 Unrestricted domain: all real numbers.
 Range: $y > 0$ if $a > 0$; $y < 0$ if $a < 0$.
 y -intercept $(0, a)$; asymptote $y = 0$.

Course revision aid, not an official STAAR reference sheet. [TEA official mathematics resources](#).

For further explanations and examples, use the dated lesson PDFs. Edition 1.0 . September 10, 2026.