

Algebra: Concepts and Connections Formula Sheet

The formulas below are provided to students during testing in both the online testing platform and the printed test booklet. This page may be printed for instructional use during the school year, but it MAY NOT be used as scratch paper during test administration.

Linear Formulas

Slope Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Linear Equations

Slope-Intercept Form: $y = mx + b$

Point-Slope Form: $y - y_1 = m(x - x_1)$

Standard Form: $Ax + By = C$

Arithmetic Sequence Formulas

Recursive: $a_n = a_{n-1} + d$

Explicit: $a_n = a_1 + d(n - 1)$

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint of a Line Segment

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Exponential Formulas

Exponential Equation

$$y = ab^x$$

Geometric Sequence Formulas

Recursive: $a_n = r(a_{n-1})$

Explicit: $a_n = a_1 \cdot r^{n-1}$

Compound Interest Formula

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

Quadratic Formulas

Quadratic Equations

Standard Form: $y = ax^2 + bx + c$

Vertex Form: $y = a(x - h)^2 + k$

Factored Form: $y = a(x - r)(x - s)$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Average Rate of Change

Average rate of change is the change in the y -value divided by the change in the x -value for two distinct points on a graph.

Statistics Formulas

Mean

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

Mean is the sum of all the data values divided by the total number of data values.

Interquartile Range (IQR)

$$IQR = Q_3 - Q_1$$

Interquartile range is the distance between the third quartile and the first quartile of a set of data.

Outliers

Outliers are more than 1.5 times the interquartile range below the first quartile or above the third quartile.

Standard Deviation

Standard deviation is determined by finding the sum of the squared distances between each data value and the mean, dividing by the number of data values, and then taking the square root.