Algebra 2 Semester Exam Reference Sheet

Slope-intercept form of a linear equation

$$y = mx + b$$

where m = slope and b = y-intercept

Point-slope form of a linear equation

$$y - y_1 = m(x - x_1)$$

where m = slope and (x_1, y_1) is a point on the line

Slope Formula

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

where m = slope and (x_1, y_1) and (x_2, y_2) are points on the line

Quadratic Formula

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

where *a*, *b*, and *c* are coefficients in an equation of the form $ax^2 + bx + c = 0$

Exponential Growth and Decay

$$A(t) = a(1 + r)^t$$

$A(t)$ = amount after t time periods
a = initial amount
r = rate of growth or decay
t = number of periods

Interest Formulas

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

Continuous Compound Interest: $A = Pe^{rt}$

P = present value A = future value
r = annual interest rate t = time in years
n = frequency of compounding per year

Logarithm Properties

$$\log_b MN = \log_b M + \log_b N$$

$$\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$$

$$\log_b M^p = p \log_b M$$

Change of Base Formula

$$\log_b m = \frac{\log_c m}{\log_c b}$$

Arithmetic and Geometric Sequences and Series

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

Geometric Sequence: $a_n = a_1 r^{n-1}$

Sum of a Finite Arithmetic Series: $S_n = \frac{n(a_1 + a_n)}{2}$ or $S_n = \frac{1}{2} n[2a_1 + (n-1)d]$

Sum of a Finite Geometric Series: $S_n = \frac{a_1(1-r^n)}{1-r}, \quad r \neq 1$

Sum of an Infinite Geometric Series: $S_n = \frac{a_1}{1-r}, \quad where \ |r| < 1$

a_n = nth term
d = common difference
a_1 = 1st term
r = common ratio
n = number of terms in series

Conic Sections (Honors Only)

Parabola $y = \frac{1}{4c}(x-h)^2 + k$ or $x = \frac{1}{4c}(y-k)^2 + h$

Circle $(x-h)^2 + (y-k)^2 = r^2$

Ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ or $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$

Hyperbola $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ or $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$