

Algebra 2 Semester 1 Formula Sheet

TOPIC 1

$$f(x) = x$$

$$y = mx + b$$

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

$$f(x) = x^2$$

$$g(x) = a\left(\frac{x-h}{b}\right)^2 + k$$

Vertex (h, k)

$$f(x) = |x|$$

$$g(x) = a\left|\frac{x-h}{b}\right| + k$$

Vertex (h, k)

$$a_n = \begin{cases} a_1, & n=1 \\ a_{n-1} + d, & n>1 \end{cases} \quad a_n = a_1 + d(n-1); n \geq 1$$

TOPIC 2

$$f(x) = x^2$$

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

$$y = ax^2 + bx + c$$

$$y = a(x - R_1)(x - R_2)$$

Vertex Form

Standard Form

Factored Form

$$x = -\frac{b}{2a}$$

$$\text{discriminant: } b^2 - 4ac$$

Factoring Examples

$$x^2 + 7x + 10 = 0$$

$$(x+5)(x+2) = 0$$

$$x = -5, \quad x = -2$$

$$3x^2 - 12x + 9 = 0$$

$$3(x^2 - 4x + 3) = 0$$

$$3(x-3)(x-1) = 0$$

$$x = 3, \quad x = 1$$

$$x^2 - 16 = 0$$

$$(x-4)(x+4) = 0$$

$$x = 4, \quad x = -4$$

Complete the Square Example

$$x^2 + 8x + \underline{\quad} = 6$$

$$x^2 + 8x + \left(\frac{8}{2}\right)^2 = 6 + \left(\frac{8}{2}\right)^2$$

$$(x+4)^2 = 22 \rightarrow x = -4 \pm \sqrt{22}$$

Quadratic Formula

$$\text{if } ax^2 + bx + c = 0$$

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

TOPIC 3

$$y = ax^n + bx^{n-1} + cx^{n-2} + \dots$$

$$y = a(x - R_1)(x - R_2)(x - R_3) \dots$$

Single Root

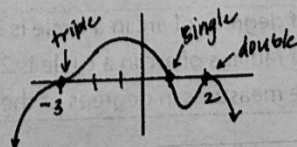
$$(x-1)^1$$

Double Root

$$(x-2)^2$$

Triple Root

$$(x+3)^3$$

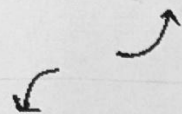


End Behavior $y = ax^n + \dots$

$$n = \text{odd}, a > 0$$

$$\text{as } x \rightarrow \infty, y \rightarrow \infty$$

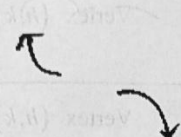
$$\text{as } x \rightarrow -\infty, y \rightarrow -\infty$$



$$n = \text{odd}, a < 0$$

$$\text{as } x \rightarrow \infty, y \rightarrow -\infty$$

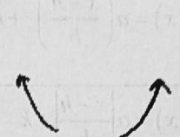
$$\text{as } x \rightarrow -\infty, y \rightarrow \infty$$



$$n = \text{even}, a > 0$$

$$\text{as } x \rightarrow \infty, y \rightarrow \infty$$

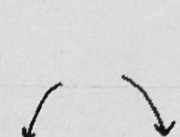
$$\text{as } x \rightarrow -\infty, y \rightarrow \infty$$



$$n = \text{even}, a < 0$$

$$\text{as } x \rightarrow \infty, y \rightarrow -\infty$$

$$\text{as } x \rightarrow -\infty, y \rightarrow -\infty$$



Topic 4

$$f(x) = \frac{1}{x}$$

$$g(x) = \frac{a}{x-h} + k$$

Asymptotes $x = h$

$y = k$

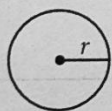
Multiplication/Division Example

$$\frac{(x-m)(x-n)}{(x-m)} \cdot \frac{(x-o)}{(x-p)(x-n)} = \frac{(x-o)}{(x-p)}, x \neq m, n$$

Addition/Subtraction Example

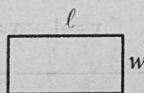
$$\frac{5}{(x-m)} + \frac{2}{(x-n)} = \frac{5(x-n)}{(x-m)(x-n)} + \frac{2(x-m)}{(x-n)(x-m)} = \frac{5x-5n+2x-2m}{(x-m)(x-n)} = \frac{7x-5n-2m}{(x-m)(x-n)}$$

SAT Formulas

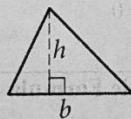


$$A = \pi r^2$$

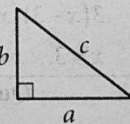
$$C = 2\pi r$$



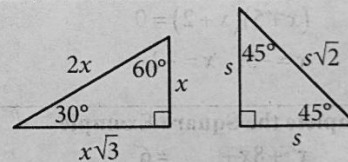
$$A = \ell w$$



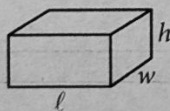
$$A = \frac{1}{2}bh$$



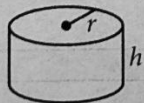
$$c^2 = a^2 + b^2$$



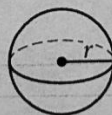
Special Right Triangles



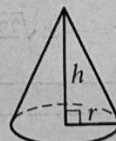
$$V = \ell wh$$



$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.