

# FREEBIE!

**Conic Sections Formula Sheet**

**Circles:**

|               | Center at Origin  | Center at $(h, k)$            |
|---------------|-------------------|-------------------------------|
| Standard Form | $x^2 + y^2 = r^2$ | $(x - h)^2 + (y - k)^2 = r^2$ |
| Radius:       | $r$               | $r$                           |
| Diameter:     | $2r$              | $2r$                          |

**Parabolas:**

Diagrams showing parabolas opening up, down, left, and right with labels for vertex, focus, directrix, and latus rectum.

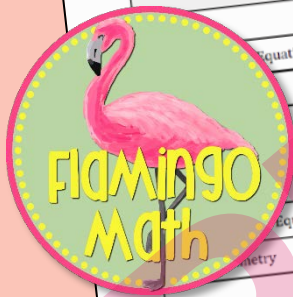
**Parabolas centered at the Origin:**

|           | Vertical    | Horizontal  |
|-----------|-------------|-------------|
| Equation  | $x^2 = 4cy$ | $y^2 = 4cx$ |
| Vertex    | $x = 0$     | $y = 0$     |
| Focus     | $(0, c)$    | $(c, 0)$    |
| Directrix | $y = -c$    | $x = -c$    |

**Parabolas centered at  $(h, k)$**

|           | Vertical                | Horizontal              |
|-----------|-------------------------|-------------------------|
| Equation  | $(x - h)^2 = 4c(y - k)$ | $(y - k)^2 = 4c(x - h)$ |
| Vertex    | $x = h$                 | $y = k$                 |
| Focus     | $(h, k + c)$            | $(h + c, k)$            |
| Directrix | $y = k - c$             | $x = h - c$             |

Right if  $c > 0$



**Ellipses:**

Diagrams showing horizontal and vertical ellipses with labels for major vertex, minor vertex, foci, and semi-major axis  $a$ .

**Horizontal Ellipses:**

Equation:  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

**Vertical Ellipses:**

Equation:  $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

**Parabolas:**

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

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

# CONIC SECTIONS REFERENCE SHEET

# FLAMINGO MATH

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## Conic Sections Reference Sheet

Here is a complete reference sheet for students to use while mastering the details of conic sections. You can print this reference sheet and use it in a variety of ways:

- 1) Run on colorful card stock, laminate, and sell as a fund-raiser for your department.
- 2) Copy and have students place them in their Interactive Notebooks.
- 3) Allow students to use your class set as a reference on Chapter quizzes or tests.

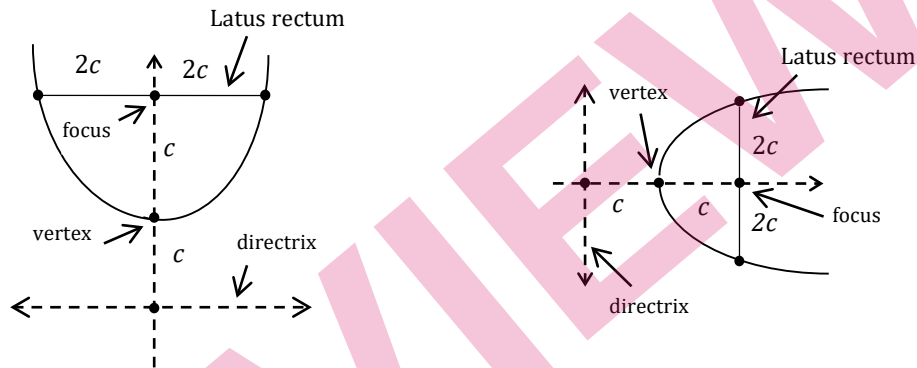
Please visit my store for more engaging task card activities.

# Conic Sections Formula Sheet

## Circles:

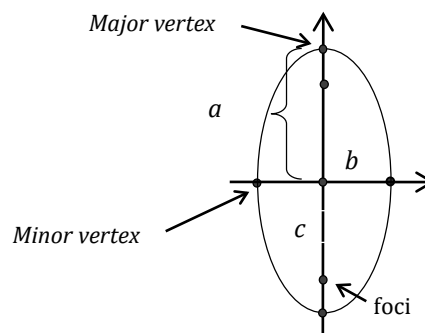
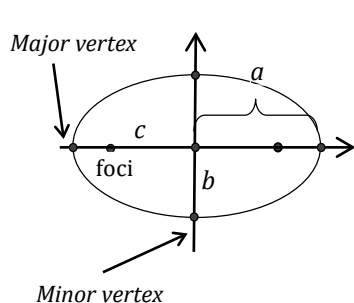
|                      | Center at Origin  | Center at $(h, k)$            |
|----------------------|-------------------|-------------------------------|
| <b>Standard Form</b> | $x^2 + y^2 = r^2$ | $(x - h)^2 + (y - k)^2 = r^2$ |
| <b>Radius:</b>       | $r$               | $r$                           |
| <b>Diameter:</b>     | $2r$              | $2r$                          |

## Parabolas:



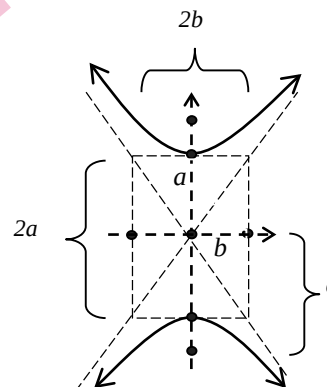
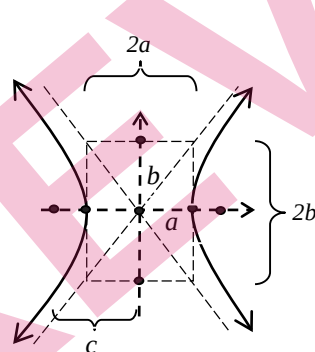
| Parabolas centered at the Origin: |                                          |                                     |
|-----------------------------------|------------------------------------------|-------------------------------------|
| Orientation:                      | Vertical                                 | Horizontal                          |
| Standard Form of Equation         | $x^2 = 4cy$                              | $y^2 = 4cx$                         |
| Axis of Symmetry                  | $x = 0$                                  | $y = 0$                             |
| Focus                             | $(0, c)$                                 | $(c, 0)$                            |
| Directrix                         | $y = -c$                                 | $x = -c$                            |
| Parabolas centered at $(h, k)$    |                                          |                                     |
| Standard Form of Equation         | $(x - h)^2 = 4c(y - k)$                  | $(y - k)^2 = 4c(x - h)$             |
| Axis of Symmetry                  | $x = h$                                  | $y = k$                             |
| Focus                             | $(h, k + c)$                             | $(h + c, k)$                        |
| Directrix                         | $y = k - c$                              | $x = h - c$                         |
| Opening                           | Upward if $c > 0$<br>Downward if $c < 0$ | Right if $c > 0$<br>Left if $c < 0$ |

## Ellipses:



| $a^2$ is always largest                           |                                                     | $c^2 = a^2 - b^2$                                   |
|---------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
| Orientation:                                      | Horizontal                                          | Vertical                                            |
| Equation in Standard Form Centered at the Origin: | $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$             | $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$             |
| <b>Ellipses centered at <math>(h, k)</math>:</b>  |                                                     |                                                     |
| Equation in Standard Form                         | $\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$ | $\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$ |
| Major Vertices                                    | $(h \pm a, k)$                                      | $(h, k \pm a)$                                      |
| Foci                                              | $(h \pm c, k)$                                      | $(h, k \pm c)$                                      |

## Hyperbolas:



| $a^2$ is always first                              |                                                     | $c^2 = a^2 + b^2$                                   |
|----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
| Orientation:                                       | Horizontal                                          | Vertical                                            |
| Equation in Standard Form Centered at the Origin:  | $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$             | $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$             |
| <b>Hyperbolas centered at <math>(h, k)</math>:</b> |                                                     |                                                     |
| Equation in Standard Form                          | $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$ | $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$ |
| Foci                                               | $(h \pm c, k)$                                      | $(h, k \pm c)$                                      |
| Asymptotes                                         | $y - k = \pm \frac{b}{a}(x - h)$                    | $y - k = \pm \frac{a}{b}(x - h)$                    |