Goals:

* I can write equations of parabolas in standard form.
* I can graph parabolas.

Equations of Parabolas





**Standard form:** $y=a\left(x-h\right)^{2}+k$

**General form:** $y=ax^{2}+bx+c$

Example 1: Analyze the Equation of a Parabola

Write $y=2x^{2}-12x+6$ in standard form. Identify the vertex, axis of symmetry, and direction of opening of the parabola.

|  |  |  |
| --- | --- | --- |
| $$y=$$ | $$2x^{2}-12x+6$$ | Original Equation |
|  | $$2\left(x^{2}-6x\right)+6$$ | Factor 2 from the *x*- and $x^{2}$- terms. |
|  | $2(x^{2}-6x+$ $)+6-2($ $)$ | Complete the square on the right side. |
|  | $$2\left(x^{2}-6x+ \\_\\_\\_\\_\right)+6-2\left(\\_\\_\\_\\_\right)$$ | The 9 added when you complete the square is multiplied by 2. |
|  | $$2\left(x-3\right)^{2}-12$$ | Factor. |

\*The number that goes in the box comes $\left(-\frac{6}{2}\right)^{2}$. The $-6$ came from the number next to the *x* in step 2. Always divide by 2 and always square the number.\*

a= \_\_\_\_\_\_\_\_\_

h= \_\_\_\_\_\_\_\_\_

k= \_\_\_\_\_\_\_\_\_

The vertex is (\_\_\_\_\_, \_\_\_\_\_)

The equation of the axis of symmetry is \_\_\_\_\_\_\_\_\_\_.

The parabola opens \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| Formula: | This Example |
| Focus: $\left(h, k+\frac{1}{4a}\right)$ |  |
| Directrix: $y=k-\frac{1}{4a}$ |  |
| Length of Latus Rectum: $\left|\frac{1}{a}\right|$ units |  |

Example 2: Find all pieces of the equation and graph the equation.

$$y+2x^{2}+32=-16x-1$$

Use completing the square to put the equation into STANDARD FORM.

a= \_\_\_\_\_\_\_\_\_

h= \_\_\_\_\_\_\_\_\_

k= \_\_\_\_\_\_\_\_\_

The vertex is (\_\_\_\_\_, \_\_\_\_\_)

The equation of the axis of symmetry is \_\_\_\_\_\_\_\_\_\_.

The parabola opens \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| Formula: | This Example |
| Focus: $\left(h, k+\frac{1}{4a}\right)$ |  |
| Directrix: $y=k-\frac{1}{4a}$ |  |
| Length of Latus Rectum: $\left|\frac{1}{a}\right|$ units |  |