MATH MONKS

Completing the Squares *With* **Hyperbolas**

Standard Forms:

Centered at (0, 0)

Along the x–axis

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

Along the y-axis

$$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Centered at (h, k)

Parallel to the x-axis

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

Parallel to the y-axis

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

Complete the square to find the hyperbola in its standard form.

1. $16x^2 - 25y^2 + 96x - 50y + 359 = 0$

2. $4x^2 - 9y^2 - 20x + 18y + 61 = 0$

3. $36x^2 - 25y^2 + 72x - 50y - 889 = 0$

4. $25x^2 - 16y^2 - 150x + 160y - 575 = 0$

5. $x^2 - 36y^2 + 14x - 72y - 275 = 0$

6. $-9x^2 + 25y^2 - 72x - 50y - 344 = 0$

Completing the Squares *With* **Hyperbolas**
(Answers)

Standard Forms:

Centered at (0, 0)

Along the x–axis   Along the y-axis

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \qquad\qquad \frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Centered at (h, k)

Parallel to the x-axis   Parallel to the y-axis

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

Complete the square to find the hyperbola in its standard form.

1. $16x^2 - 25y^2 + 96x - 50y + 359 = 0$

2. $4x^2 - 9y^2 - 20x + 18y + 61 = 0$

$$\frac{(x+3)^2}{15} - \frac{(y+1)^2}{9.6} = 1$$

$$\frac{(x-2.5)^2}{11.25} - \frac{(y-1)^2}{5} = 1$$

3. $36x^2 - 25y^2 + 72x - 50y - 889 = 0$

4. $25x^2 - 16y^2 - 150x + 160y - 575 = 0$

$$\frac{(x+1)^2}{25} - \frac{(y+1)^2}{36} = 1$$

$$\frac{(x-3)^2}{16} - \frac{(y-5)^2}{25} = 1$$

5. $x^2 - 36y^2 + 14x - 72y - 275 = 0$

6. $-9x^2 + 25y^2 - 72x - 50y - 344 = 0$

$$\frac{(x+7)^2}{288} - \frac{(y+1)^2}{8} = 1$$

$$\frac{(y-1)^2}{9} - \frac{(x+4)^2}{25} = 1$$