

Ellipses - Writing Equations Notes

Ellipses – Writing Equations

Example 5:

Write each equation in standard form.

$$9x^2 + 4y^2 - 54x + 40y + 37 = 0$$

$$(9x^2 - 54x) + (4y^2 + 40y) = -37$$

$$9(x^2 - 6x + 9) + 4(y^2 + 10y + 25) = -37 + 81 + 100$$

$$\frac{9(x-3)^2}{144} + \frac{4(y+5)^2}{144} = \frac{144}{144}$$

$$\frac{(x-3)^2}{16} + \frac{(y+5)^2}{36} = 1$$

- 1) rearrange / group
- 2) factor out lead coefficients
- 3) complete the square *
- 4) factor / combine
- 5) divide eqn. = 1

Example 6:

Write each equation in standard form.

$$x^2 + 4y^2 - 6x + 8y - 3 = 0$$

$$(x^2 - 6x) + (4y^2 + 8y) = 3$$

$$(x^2 - 6x + 9) + 4(y^2 + 2y + 1) = 3 + 9 + 4$$

$$\frac{(x-3)^2}{16} + \frac{4(y+1)^2}{16} = \frac{16}{16}$$

$$\frac{(x-3)^2}{16} + \frac{(y+1)^2}{4} = 1$$

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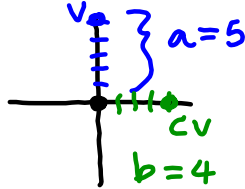
Example 7:

Write an equation of each ellipse.

★ center: (0, 0) →

★ vertex: (0, 5) vertical

★ co-vertex: (4, 0)



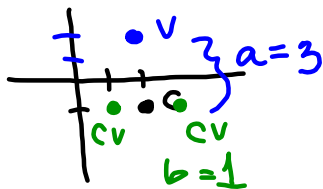
$$\frac{x^2}{16} + \frac{y^2}{25} = 1$$

Example 8:

★ center: (2, -1) →

★ vertex: (2, 2)

★ minor axis length 2



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

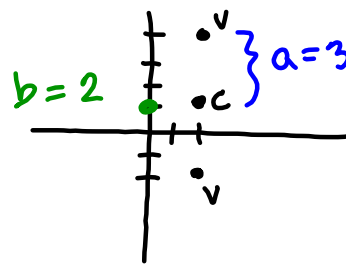
Example 9:

vertices: (2, 4) and (2, -2)

co-vertices: (0, 1) and (4, 1)

Center = midpoint
of vertices
(or co-vertices)

$$C: \left(\frac{4}{2}, \frac{2}{2}\right) = (2, 1)$$



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