

Ellipses: Writing in Standard Form

Use the information provided to write the standard form equation of each ellipse.

1) $x^2 + 9y^2 - 14x - 72y + 112 = 0$

$$x^2 - 14x + \underline{\quad} + 9y^2 - 72y + \underline{\quad} = -112 + \underline{\quad} + \underline{\quad}$$

$$x^2 - 14x + \underline{49} + 9(y^2 - 8y + \underline{16}) = -112 + \underline{49} + 9(\underline{16})$$

$$\frac{(x-7)^2}{81} + \frac{9(y-4)^2}{81} = \frac{81}{81}$$

$$\boxed{\frac{(x-7)^2}{81} + \frac{(y-4)^2}{9} = 1}$$

3) $9x^2 + y^2 - 54x + 8y + 61 = 0$

$$9x^2 - 54x + \underline{\quad} + y^2 + 8y + \underline{\quad} = -61 + \underline{\quad} + \underline{\quad}$$

$$9(x^2 - 6x + \underline{9}) + y^2 + 8y + \underline{16} = -61 + 9(\underline{9}) + \underline{16}$$

$$\frac{9(x-3)^2}{36} + \frac{(y+4)^2}{36} = \frac{36}{36}$$

$$\boxed{\frac{(x-3)^2}{4} + \frac{(y+4)^2}{36} = 1}$$

5) $9x^2 + 4y^2 + 144x - 24y + 288 = 0$

$$9x^2 + 144x + \underline{\quad} + 4y^2 - 24y + \underline{\quad} = -288 + \underline{\quad} + \underline{\quad}$$

$$9(x^2 + 16x + \underline{64}) + 4(y^2 - 6y + \underline{9}) = -288 + 9(\underline{64}) + 4(\underline{9})$$

$$\frac{9(x+8)^2}{324} + \frac{4(y-3)^2}{324} = \frac{324}{324}$$

$$\boxed{\frac{(x+8)^2}{36} + \frac{(y-3)^2}{81} = 1}$$

7) $4x^2 + 16y^2 - 36x + 160y - 303 = 0$

$$4x^2 - 36x + \underline{\quad} + 16y^2 + 160y + \underline{\quad} = 303 + \underline{\quad} + \underline{\quad}$$

$$4(x^2 - 9x + \underline{20.25}) + 16(y^2 + 10y + \underline{25}) = 303 + 4(\underline{20.25}) + 16(\underline{25})$$

$$\frac{4(x-4.5)^2}{784} + \frac{16(y+5)^2}{784} = \frac{784}{784}$$

$$\boxed{\frac{(x-4.5)^2}{196} + \frac{(y+5)^2}{49} = 1}$$

9) $4x^2 + y^2 - 8x - 18y + 49 = 0$

$$4x^2 - 8x + \underline{\quad} + y^2 - 18y + \underline{\quad} = -49 + \underline{\quad} + \underline{\quad}$$

$$4(x^2 - 2x + \underline{1}) + y^2 - 18y + \underline{81} = -49 + 4(\underline{1}) + \underline{81}$$

$$\frac{4(x-1)^2}{36} + \frac{(y-9)^2}{36} = \frac{36}{36}$$

$$\boxed{\frac{(x-1)^2}{9} + \frac{(y-9)^2}{36} = 1}$$

2) $25x^2 + 9y^2 - 100x + 36y - 89 = 0$

$$25x^2 - 100x + \underline{\quad} + 9y^2 + 36y + \underline{\quad} = +89 + \underline{\quad} + \underline{\quad}$$

$$25(x^2 - 4x + \underline{4}) + 9(y^2 + 4y + \underline{4}) = 89 + 25(\underline{4}) + 9(\underline{4})$$

$$\frac{25(x-2)^2}{225} + \frac{9(y+2)^2}{225} = \frac{225}{225}$$

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

4) $4x^2 + y^2 - 56x + 16y + 116 = 0$

$$4x^2 - 56x + \underline{\quad} + y^2 + 16y + \underline{\quad} = -116 + \underline{\quad} + \underline{\quad}$$

$$4(x^2 - 14x + \underline{49}) + y^2 + 16y + \underline{64} = -116 + 4(\underline{49}) + \underline{64}$$

$$\frac{4(x-7)^2}{144} + \frac{(y+8)^2}{144} = \frac{144}{144}$$

$$\boxed{\frac{(x-7)^2}{36} + \frac{(y+8)^2}{144} = 1}$$

6) $x^2 + 9y^2 + 2x - 108y + 289 = 0$

$$x^2 + 2x + \underline{\quad} + 9y^2 - 108y + \underline{\quad} = -289 + \underline{\quad} + \underline{\quad}$$

$$x^2 + 2x + \underline{1} + 9(y^2 - 12y + \underline{36}) = -289 + \underline{1} + 9(\underline{36})$$

$$\frac{(x+1)^2}{36} + \frac{9(y-6)^2}{36} = \frac{36}{36}$$

$$\boxed{\frac{(x+1)^2}{36} + \frac{(y-6)^2}{4} = 1}$$

8) $16x^2 + 49y^2 - 192x + 98y - 159 = 0$

$$16x^2 - 192x + \underline{\quad} + 49y^2 + 98y + \underline{\quad} = 159 + \underline{\quad} + \underline{\quad}$$

$$16(x^2 - 12x + \underline{36}) + 49(y^2 + 2y + \underline{1}) = 159 + 16(\underline{36}) + 49(\underline{1})$$

$$\frac{16(x-6)^2}{784} + \frac{49(y+1)^2}{784} = \frac{784}{784}$$

$$\boxed{\frac{(x-6)^2}{49} + \frac{(y+1)^2}{16} = 1}$$

10) $4x^2 + y^2 - 20x - 4y - 71 = 0$

$$4x^2 - 20x + \underline{\quad} + y^2 - 4y + \underline{\quad} = 71 + \underline{\quad} + \underline{\quad}$$

$$4(x^2 - 5x + \underline{6.25}) + y^2 - 4y + \underline{4} = 71 + 4(\underline{6.25}) + \underline{4}$$

$$\frac{4(x-2.5)^2}{100} + \frac{(y-2)^2}{100} = \frac{100}{100}$$

$$\boxed{\frac{(x-2.5)^2}{25} + \frac{(y-2)^2}{100} = 1}$$