# Review of Circles & Ellipses

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1. Determine which equation below is a circle and which is an ellipse. Say how you determined your answer.

a) $5x^2 - 9x + 5y^2 - 100y + 13 = 0$

Circle
$x^2$, $y^2$ have same coeff.

b) $9x^2 - 18x + 4y^2 + 16y - 11 = 0$

Ellipse
$x^2$, $y^2$ have different coeffs.

2. For each equation below, put it into standard form for that particular shape.

a) $9x^2 + 4y^2 = 36$ Ellipse

$\frac{36}{36} \quad \frac{36}{36} \quad \frac{36}{36}$

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

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

b) $4x^2 + 4y^2 - 16x + 24y + 20 = 0$ Circle

$\frac{}{4}$

$x^2 - 4x + \frac{4}{} + y^2 + 6y + \frac{9}{} = -5 + \frac{4}{} + \frac{9}{}$

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

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

c) $4x^2 - 24x + 10y^2 - 100y = -246$ Ellipse

$4(x^2 - 6x + \underline{9}) + 10(y^2 - 10y + \underline{25}) = -246 + 36 + 250$

$\frac{4(x-3)^2}{40} + \frac{10(y-5)^2}{40} = \frac{40}{40}$

$\frac{(x-3)^2}{10} + \frac{(y-5)^2}{4} = 1$

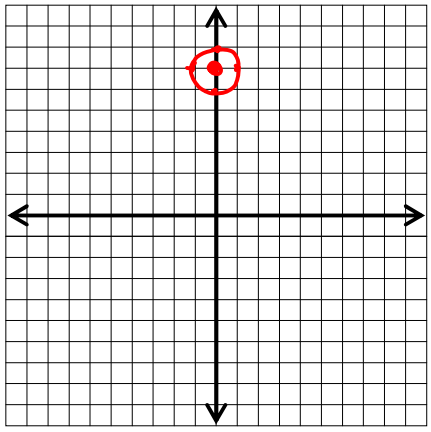
c) $\frac{(x-3)^2}{10} + \frac{(y-5)^2}{4} = 1$

3. Graph the circle:

$2x^2 + 2y^2 - 28y + 96 = 0$

$x^2 + y^2 - 14y + 49 = -48 + 49$

$x^2 + (y-7)^2 = 1$ center $(0,7)$, $r = 1$



4. Graph the ellipse:

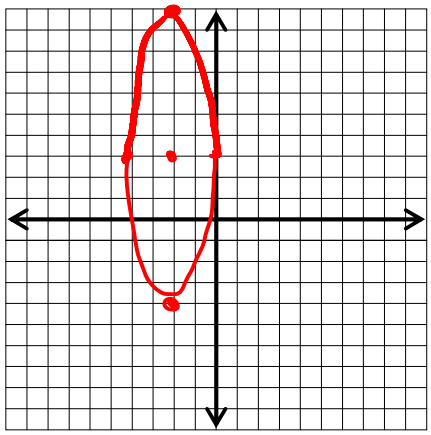
$4x^2 + 16x + 49y^2 - 294y + 261 = 0$

$4(x^2 + 4x + 4) + 49(y^2 - 6y + 9) = -261 + 16 + 441$

$\frac{4(x+2)^2}{196} + \frac{49(y-3)^2}{196} = \frac{196}{196}$

$\frac{(x+2)^2}{49} + \frac{(y-3)^2}{4} = 1$

center $(-2,3)$, $a = 7$ hor., $b = 2$



5. For each ellipse, determine the coordinates of the foci.

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

vertical, center $(-1,2)$

$c^2 = a^2 - b^2$

$c^2 = 36 - 16 = 20$

$c = \sqrt{20} = 2\sqrt{5}$

Foci: $(-1, 2 \pm 2\sqrt{5})$

b. $\frac{(x-2)^2}{4} + \frac{(y-5)^2}{1} = 1$

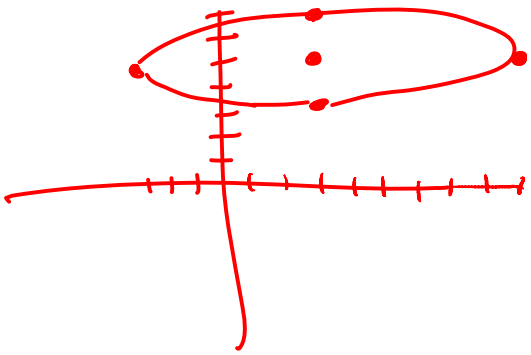
horizontal, center $(2,5)$

$c^2 = 4 - 1$

$c = \sqrt{3}$

Foci: $(2 \pm \sqrt{3}, 5)$

6. Write the equation of the ellipse with a major axis from (-3, 5) to (9, 5) and a minor axis that is 4 units long. $b = 2$

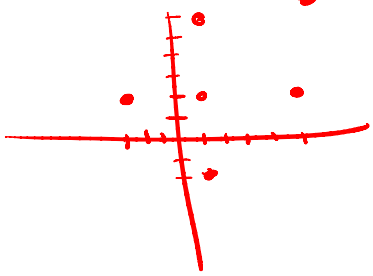


$2a = 12$, $a = 6$, horizontal

center $(3,5)$

$$\frac{(x-3)^2}{36} + \frac{(y-5)^2}{4} = 1$$

7. Write the equation of an ellipse whose focal points are (-3, 2) and (5, 2) and has a minor axis of length 8. $2b = 8$, $b = 4$



$2c = 8$, $c = 4$, $\rightarrow$ horizontal

center $(1,2)$

$c^2 = a^2 - b^2$

$16 = a^2 - 16$

$a^2 = 32$

$a = \sqrt{32}$

$$\frac{(x-1)^2}{32} + \frac{(y-2)^2}{16} = 1$$

8. Write the parametric equations of an ellipse whose center is at (-2,3) and whose major axis (vertical) has length 10 and minor axis of length 2.

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$2a = 10$, $a = 5$

$2b = 2$, $b = 1$

$$x = -2 + 1\cos t$$
$$y = 3 + 5\sin t$$

9. Write the parametric equations of a circle whose center is at (-1, 4) and has radius of length 4.

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$$x = -1 + 4\cos t$$
$$y = 4 + 4\sin t$$