Equation of an ellipses:

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

center: (h, k)

$a \rightleftarrows$ $b \uparrow\downarrow$ = vertices

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

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④ $9x^2 + 4y^2 - 18x + 16y = 11$

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

$9(x^2 - 2x + 1) + 4(y^2 + 4y + 4) = 11 + 9 + 16$

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

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

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⑤ $4y^2 - 8y + 9x^2 - 54x + 49 = 0$

$9x^2 - 54x + 4y^2 - 8y = -49$

$9(x^2 - 6x + 9) + 4(y^2 - 2y + 1) = -49 + 81 + 4$

$$\frac{9(x-3)^2}{36} + \frac{4(y-1)^2}{36} = \frac{36}{36}$$

$$\frac{(x-3)^2}{4} + \frac{(y-1)^2}{9} = 1$$

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① center $(0,0)$

$a = 8$, $b = 6$ $\quad \frac{x^2}{64} + \frac{y^2}{36} = 1$

② foci ~~$(-2,0)$; $(2,0)$~~ $\quad a = 7$

$\frac{x^2}{49} + \frac{y^2}{45} = 1$

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

$4 = 49 - b^2$

$-45 = -b^2$

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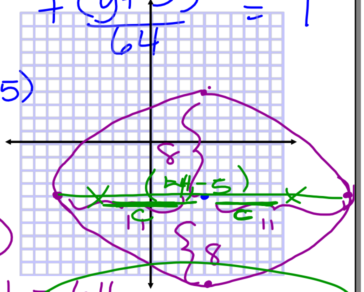
① $$\frac{(x-4)^2}{121} + \frac{(y+5)^2}{64} = 1$$



center: $(4, -5)$

$a = 11$ $\quad b = 8$

vertices:

$(15, -5)$ $(-7, -5)$

$(4, 3)$ $(4, -13)$

foci: $c^2 = 121 - 64$

$c^2 = 57$ $\quad c = \sqrt{57} = 7.5$

$(4 \pm \sqrt{57}, -5)$

or

$(4 + \sqrt{57}, -5)$ $(4 - \sqrt{57}, -5)$

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