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1. b.

$$4x^2 + 16x + y^2 - 4y - 40 = 0$$

$$(2x+4)^2 - 16 + (y-2)^2 - 4 - 40 = 0$$

$$(2x+4)^2 + (y-2)^2 = 60$$

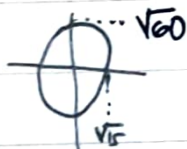
$$\frac{(2x+4)^2}{60} + \frac{(y-2)^2}{60} = 1 \rightarrow \frac{4(x+2)^2}{60 \cdot 15} + \frac{(y-2)^2}{60} = 1$$

titik pusat (0,0) naik 2 unit ke kiri $\frac{4}{2}$ unit

$$= (2, 2)$$

$$a^2 = 60 \rightarrow a = \sqrt{60}$$

$$b^2 = 15 \rightarrow b = \sqrt{15}$$



sumbu horizontal $(\pm \sqrt{60}, 0)$

sumbu vertikal $(0, \pm \sqrt{60})$

$$\text{titik fokus} = \sqrt{a^2 - b^2} = \sqrt{45} \rightarrow (-2, \pm \sqrt{45})$$

$$2. b. x^2 - 16y^2 - 4x + 32y - 59 = 0$$

$$(x-2)^2 - 4 - (4y-4)^2 + 16 - 59 = 0$$

$$(x-2)^2 - (4y-4)^2 = 59 - 16 + 4$$

$$\frac{(x-2)^2}{47} - \frac{16(y-1)^2}{47} = 1$$

titik pusat (2, 1)

$$a^2 = 47 \rightarrow a = \sqrt{47} \rightarrow \text{sumbu}$$

$$b^2 = 47 \rightarrow b = \frac{\sqrt{47}}{4}$$

$$\text{titik fokus } c = \sqrt{47 + \frac{47}{16}} = \frac{\sqrt{235}}{4} \rightarrow$$

$$(\pm(\sqrt{47}+2), 1)$$

$$(\pm(\frac{\sqrt{235}}{4}+2), 1)$$

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given asymptote $y = \pm \frac{b}{a}x$

$$y = \pm \frac{1}{4}x \rightarrow (y-1) = \pm \frac{1}{4}(x-2) \quad \nearrow \text{transformed}$$

(3) (a) $\cot 2\theta = \frac{A-C}{B}$

$$4x^2 - 7xy - 4y^2 - 5x - 5$$

$$A=4, B=-7, C=-4$$

$$\cot 2\theta = \frac{8}{-7}$$

(4) (b) $\cot 2\theta = 0 \rightarrow \theta = \frac{\pi}{4} = 45^\circ$
 $\sin \theta = \frac{\sqrt{2}}{2}, \cos \theta = \frac{\sqrt{2}}{2}$

$$x = \frac{x\sqrt{2}}{2} - \frac{y\sqrt{2}}{2}, \quad y = \frac{x\sqrt{2}}{2} + \frac{y\sqrt{2}}{2}$$

$$x^2 = \frac{x^2}{2} + \frac{y^2}{2} - 2xy, \quad y^2 = \frac{x^2}{2} + \frac{y^2}{2} + 2xy, \quad xy = \frac{x^2}{2} - \frac{y^2}{2}$$

$$5x^2 - 8xy + 5y^2 - 17 = 0$$

$$\frac{10x^2}{2} + \frac{10y^2}{2} - 8\left(\frac{x^2}{2} - \frac{y^2}{2}\right) - 17 = 0$$

$$\frac{2x^2}{2} + \frac{18y^2}{2} - 17 = 0 \rightarrow \frac{x^2}{17} + \frac{9y^2}{17} = 1 \quad \text{ellipse}$$

