联立方程（假设结论对称）

可以背的结论及检验方式

$$\begin{cases} y = kx + m \\ \dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1. \end{cases}$$

$$\therefore b^2x^2 + a^2(k^2x^2 + 2kmx + m^2) - a^2b^2 = 0$$

$$\therefore (a^2k^2+b^2)x^2 + 2kma^2x + (a^2m^2 - a^2b^2) = 0$$

Checkpoint：一次项为单项式 [1]

$$\Delta = 4k^2m^2a^4 - 4a^2(m^2-b^2)(a^2k^2+b^2)$$

$$= 4k^2m^2a^4 + 4a^2(a^2b^2k^2 + b^4 - a^2m^2k^2 - b^2m^2)$$

$$= 4a^4b^2k^2 + 4a^2b^4 - 4a^2b^2m^2$$

$$= \underbrace{4a^2b^2}_{\text{椭圆相关}}(\underbrace{a^2k^2+b^2}_{\text{二次项系数}} - \underbrace{m^2}_{\text{截距相关}})$$

Checkpoint：没有 k^2m^2 四次项 [2]

$$\boxed{\Delta > 0 \Leftrightarrow m^2 < a^2k^2 + b^2}$$

$$x_1 + x_2 = -\frac{2kma^2}{a^2k^2+b^2}$$

$$x_1 \cdot x_2 = \frac{a^2(m^2-b^2)}{a^2k^2+b^2}$$

$$|x_1 - x_2| = \sqrt{(x_1+x_2)^2 - 4x_1x_2} = \frac{2ab\sqrt{a^2k^2+b^2-m^2}}{a^2k^2+b^2}$$

$$y_1 + y_2 = k(x_1+x_2) + 2m = -\frac{2k^2ma^2}{a^2k^2+b^2} + \frac{2k^2ma^2+2mb^2}{a^2k^2+b^2} = \frac{2mb^2}{a^2k^2+b^2}$$

$$y_1 \cdot y_2 = (kx_1+m)(kx_2+m) = k^2x_1x_2 + km(x_1+x_2) + m^2 = \frac{k^2a^2m^2 - k^2a^2b^2 - 2k^2m^2a^2 + k^2a^2m^2 + m^2b^2}{a^2k^2+b^2} = \frac{b^2(m^2-k^2a^2)}{a^2k^2+b^2}$$

Checkpoint：消得很爽 [3]

$$|y_1 - y_2| = k|x_1 - x_2| = \frac{2abk\sqrt{a^2k^2+b^2-m^2}}{a^2k^2+b^2}$$

$$\sqrt{(x_1-x_2)^2 + (y_1-y_2)^2} = \frac{2ab}{a^2k^2+b^2}\sqrt{(k^2+1)(a^2k^2+b^2-m^2)}$$