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\left| \sqrt{(x-k)^2 + y^2} - \sqrt{(x+k)^2 + y^2} \right| = 2a
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\]

\[
(x - k)^2 + y^2 = (x + k)^2 + y^2 \pm 4a \sqrt{(x + k)^2 + y^2} + 4a^2
\]

\[
-4kx - 4a^2 = \pm 4a \sqrt{(x + k)^2 + y^2}
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\[
k^2 x^2 + 2a^2 kx + a^4 = a^2 x^2 + 2a^2 kx + a^2 k^2 + a^2 y^2
\]

\[
(k^2 - a^2)x^2 - a^2 y^2 = a^2 (k^2 - a^2)
\]

Let \(b^2 = k^2 - a^2\)
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(k^2 - a^2)x^2 - a^2y^2 = a^2(k^2 - a^2)
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Let \(b^2 = k^2 - a^2\)

\[
\therefore \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1
\]
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\begin{align*}
\sqrt{(x-k)^2 + y^2} - \sqrt{(x+k)^2 + y^2} &= 2a \\
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\sqrt{(x-k)^2 + y^2} &= \sqrt{(x+k)^2 + y^2} \pm 2a \\
(x-k)^2 + y^2 &= (x+k)^2 + y^2 \pm 4a\sqrt{(x+k)^2 + y^2} + 4a^2 \\
-4kx - 4a^2 &= \pm 4a\sqrt{(x+k)^2 + y^2} \\
-kx - a^2 &= \pm a\sqrt{(x+k)^2 + y^2} \\
k^2 x^2 + 2a^2 kx + a^4 &= a^2 x^2 + 2a^2 kx + a^2 k^2 + a^2 y^2 \\
(k^2 - a^2) x^2 - a^2 y^2 &= a^2 (k^2 - a^2) \\
\text{Let } b^2 &= k^2 - a^2 \\
\therefore \quad \frac{x^2}{a^2} - \frac{y^2}{b^2} &= 1
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Github:
https://min7014.github.io/math20200605001.html

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