When a directrix is $y = -p$ and a focus is $(0, p)$, find the equation for the tangent line to the parabola at a given point (x_1, y_1).[Geometric Approach]

준선이 $y = -p$ 이고 초점이 $(0, p)$ 일 때, 포물선 상의 점 (x_1, y_1) 에서의 접선의 방정식을 구하여라.[기하적 접근]

(When a directrix is $y = -p$ and a focus is $(0, p)$, find the equation for the tangent line to the parabola at a given point (x_1, y_1).[Geometric Approach])

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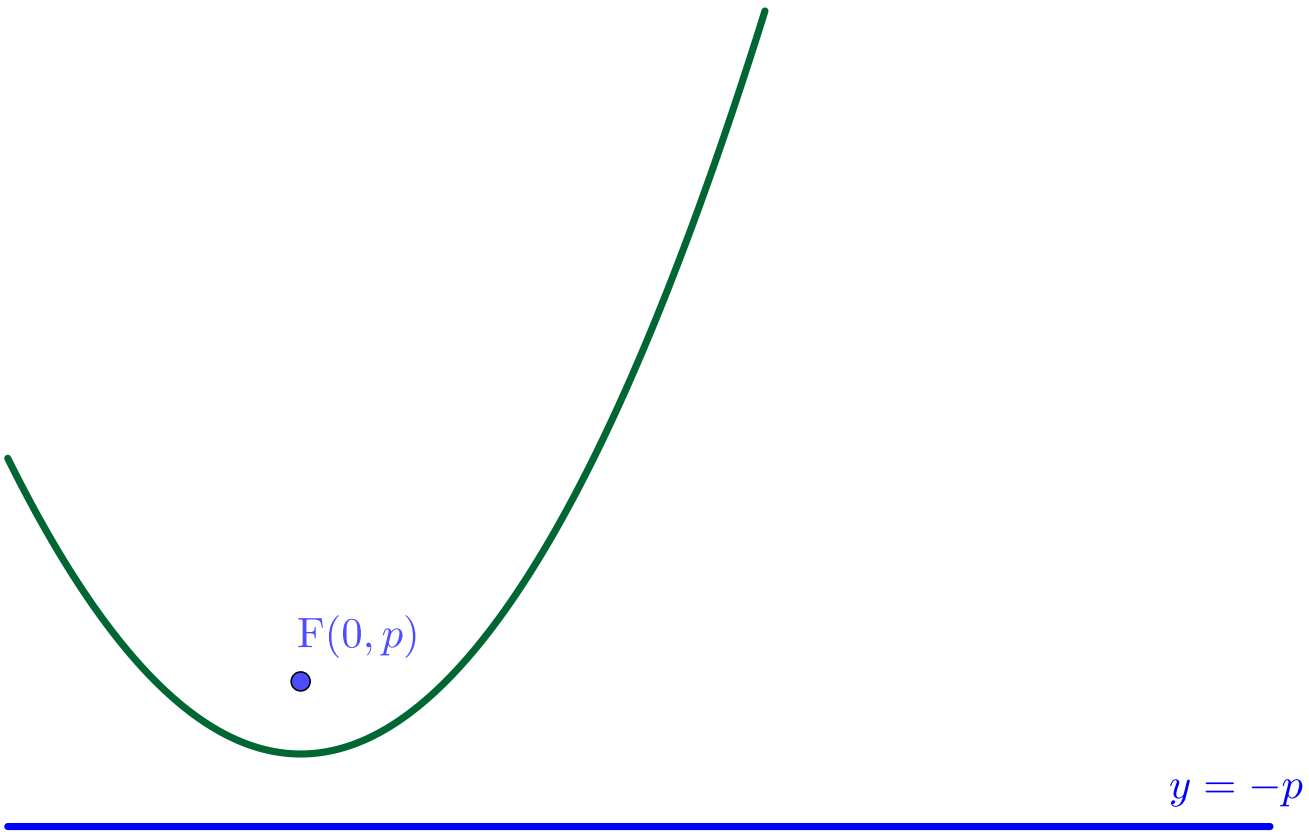

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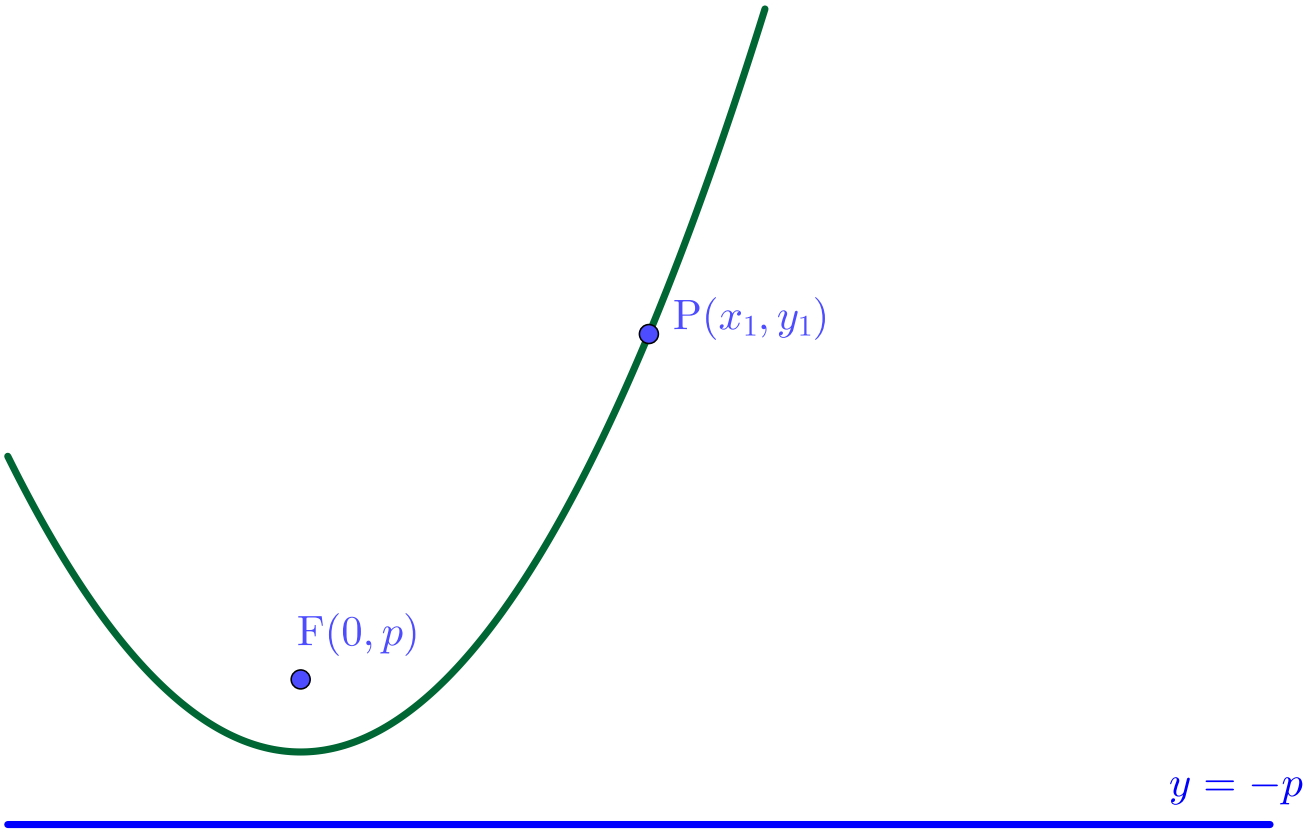

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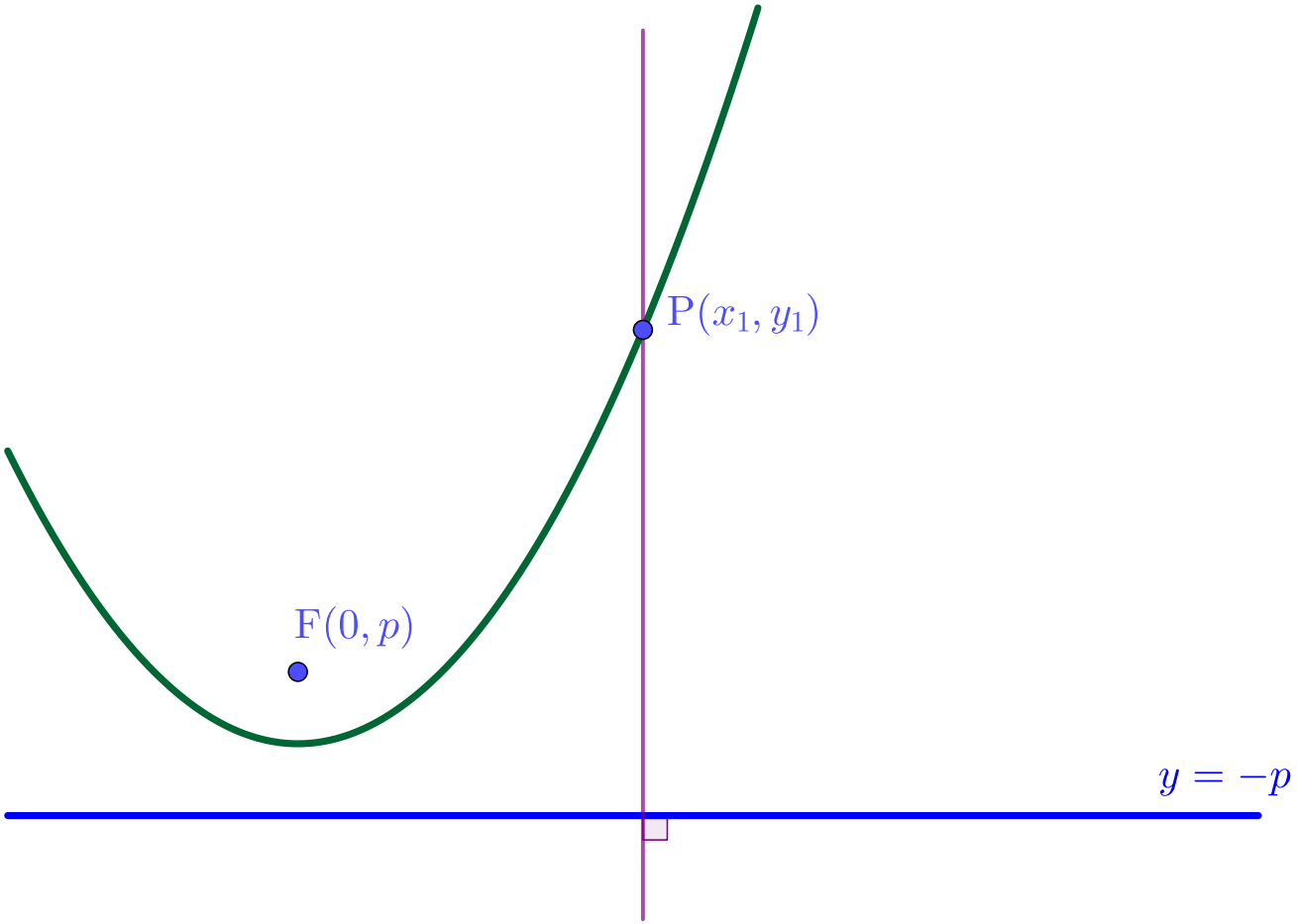

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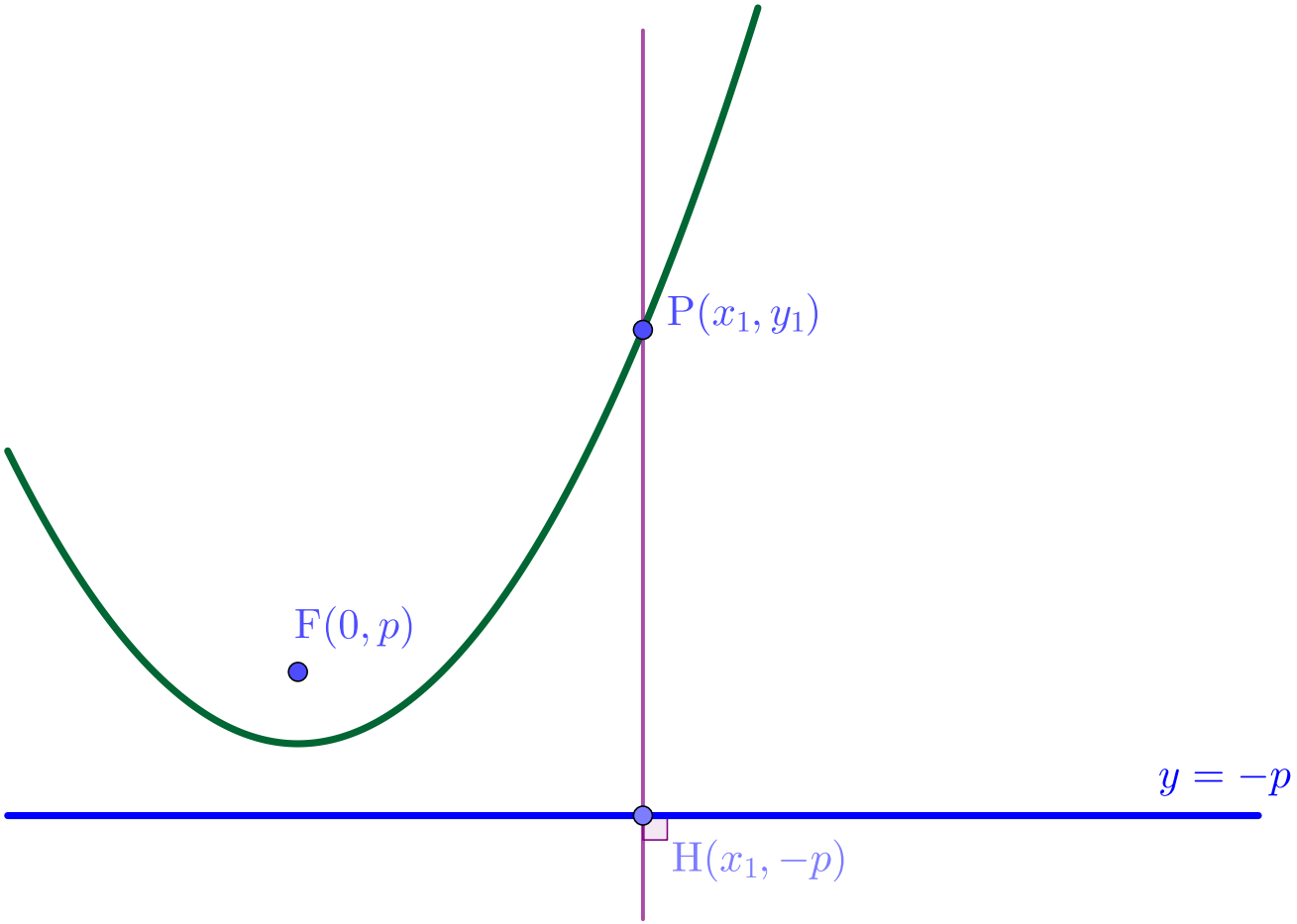

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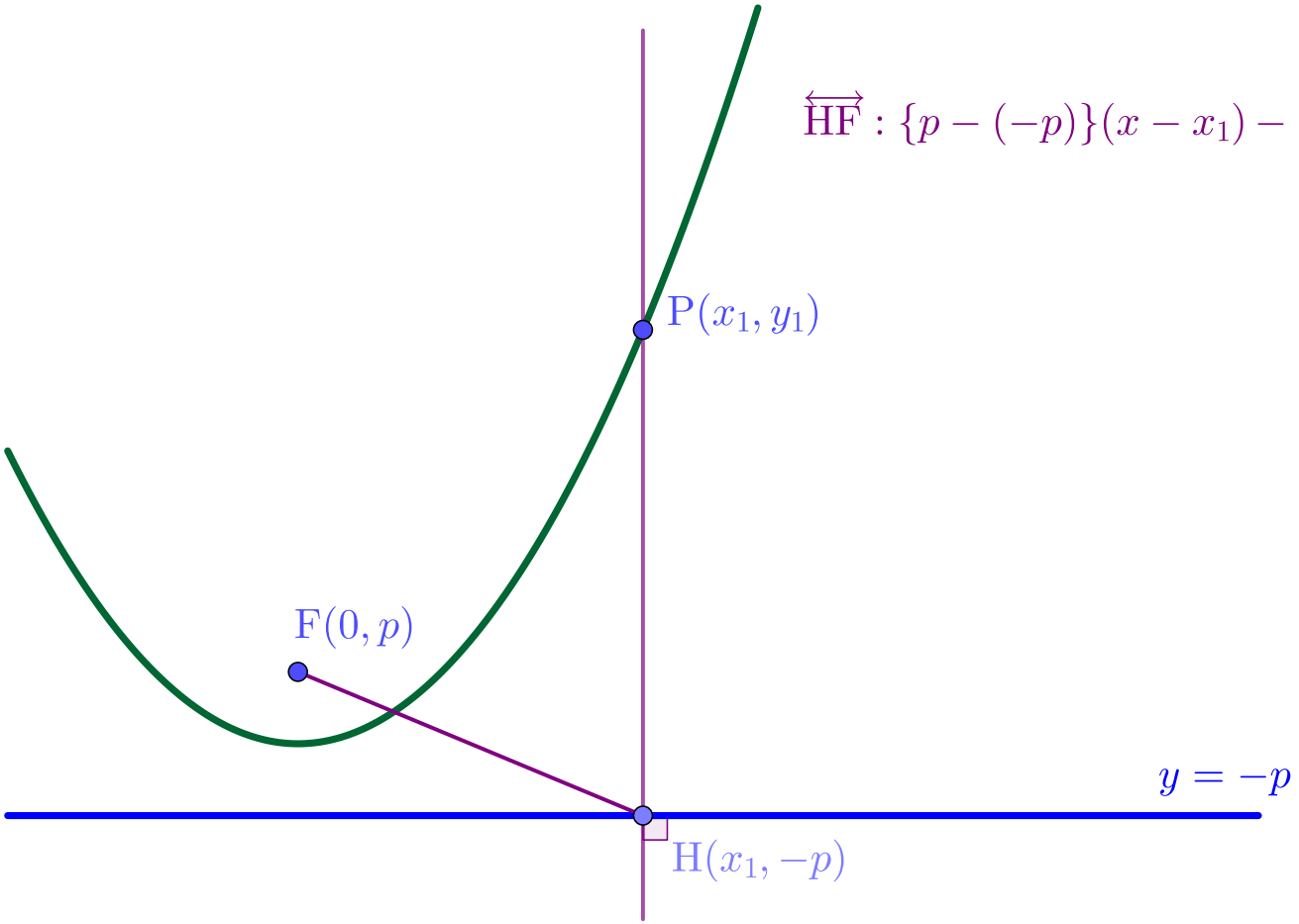

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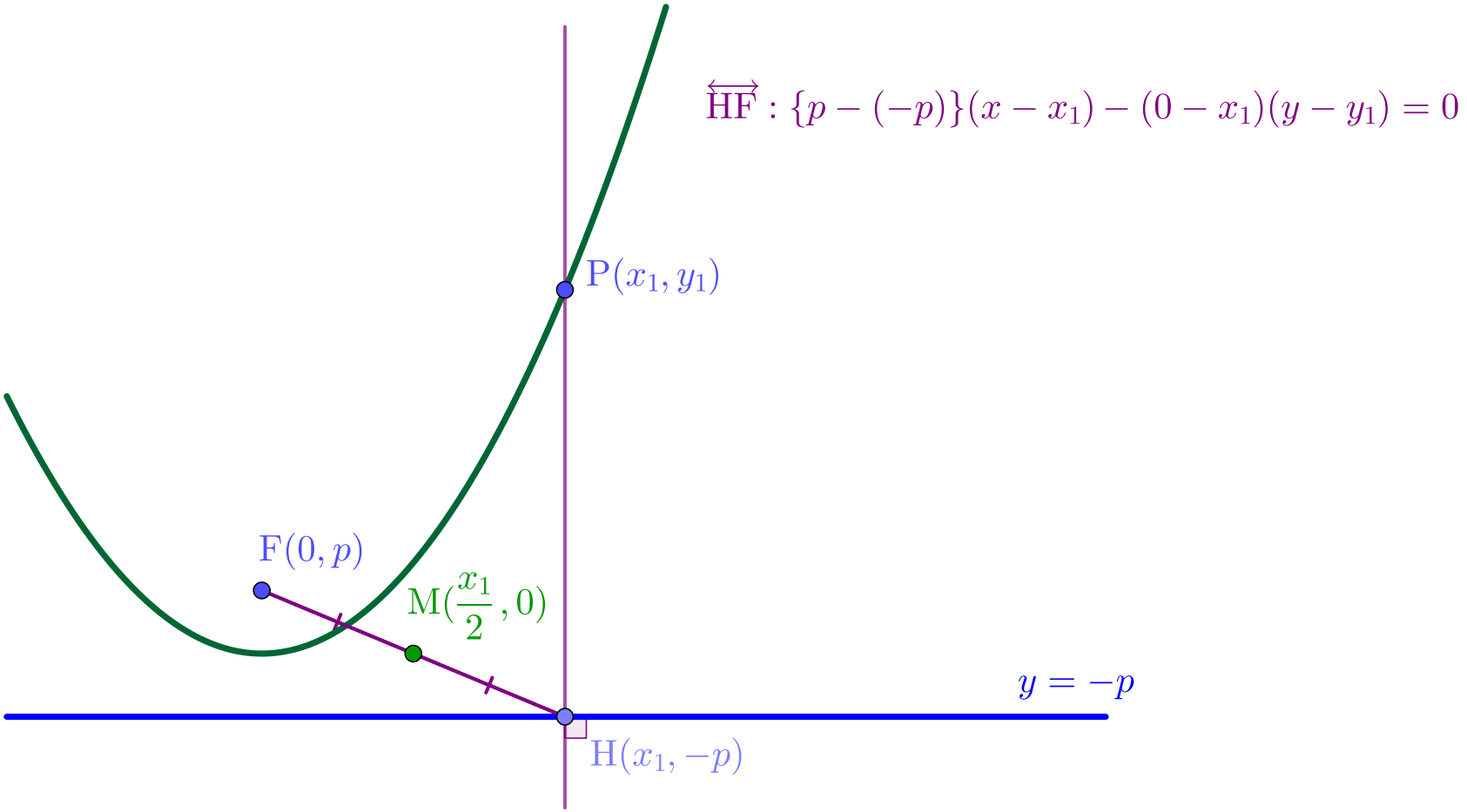

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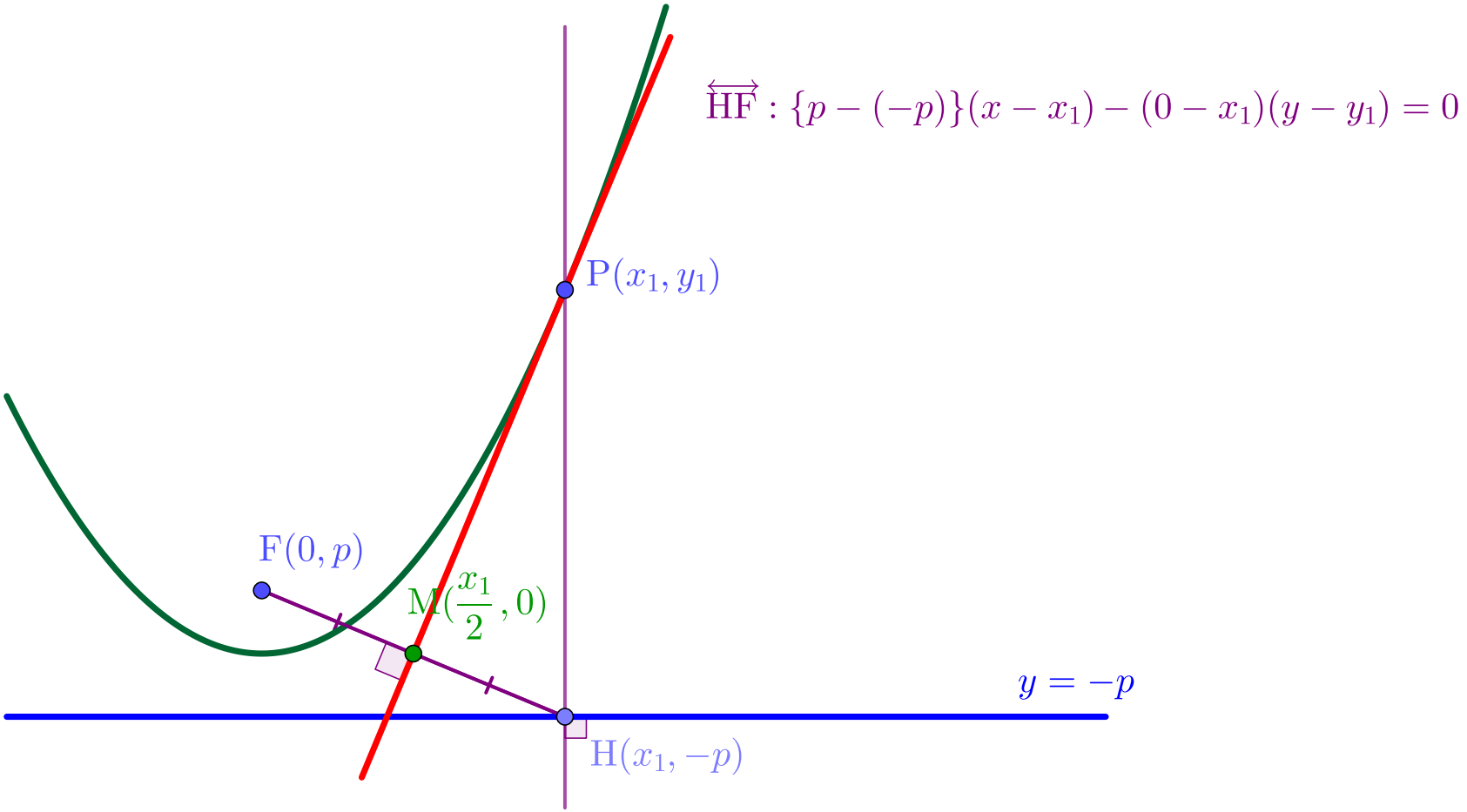

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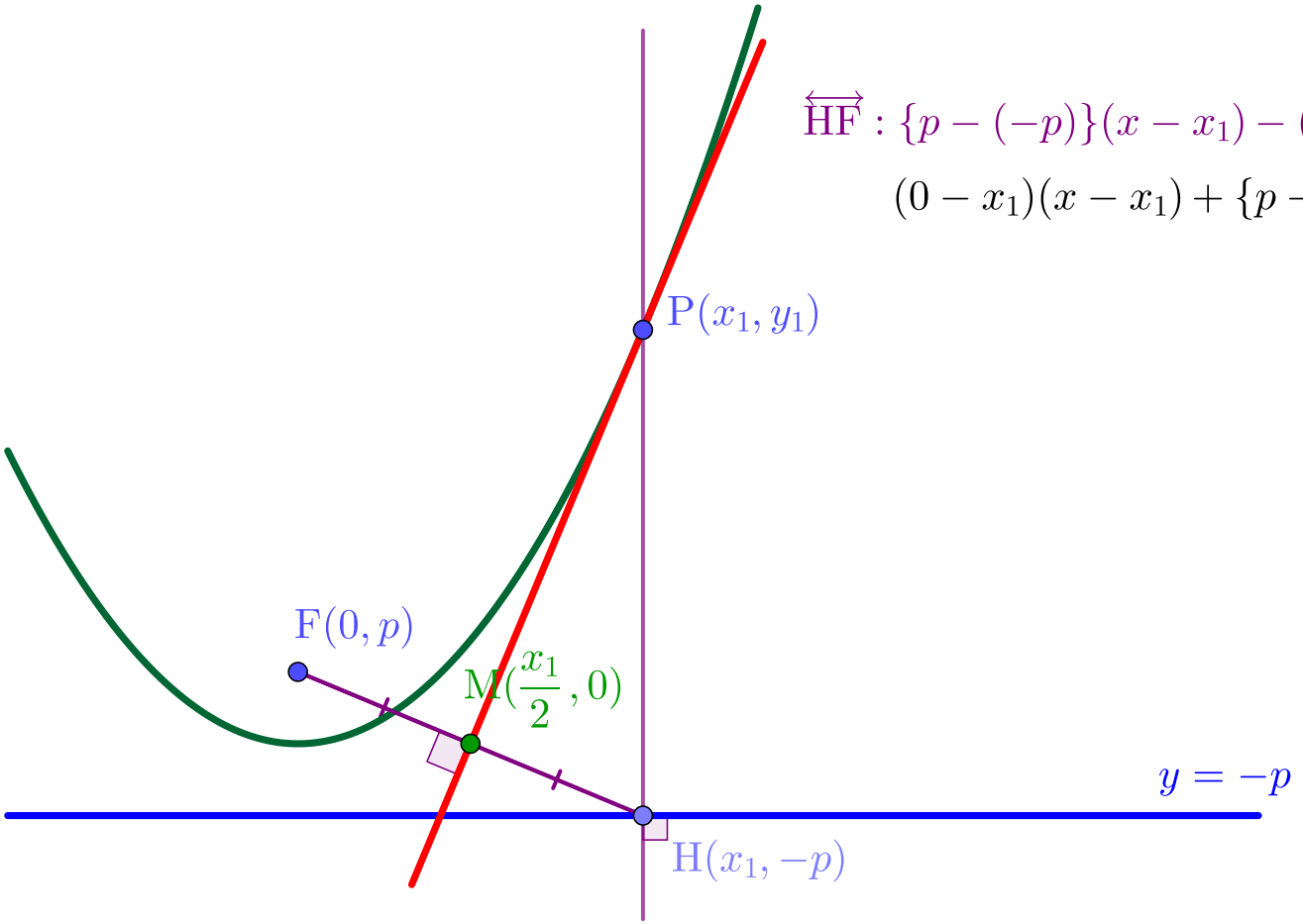

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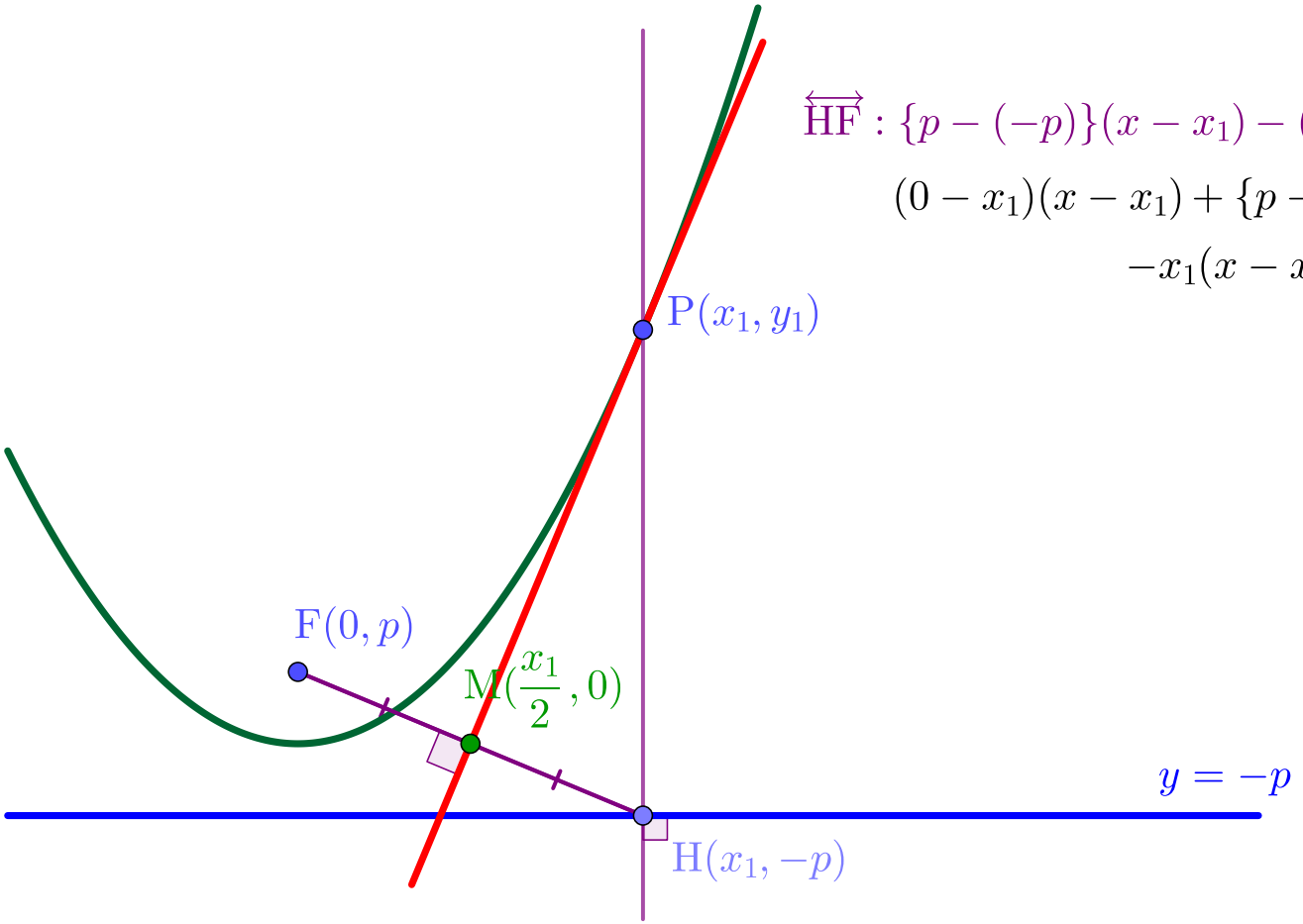

$$\overleftrightarrow{\mathrm{HF}} : \{p-(-p)\}(x-x_1)-(0-x_1)(y-y_1)=0$$

$$(0-x_1)(x-x_1)+\{p-(-p)\}(y-y_1)=0$$

$$-x_1(x-x_1)+2p(y-y_1)=0$$

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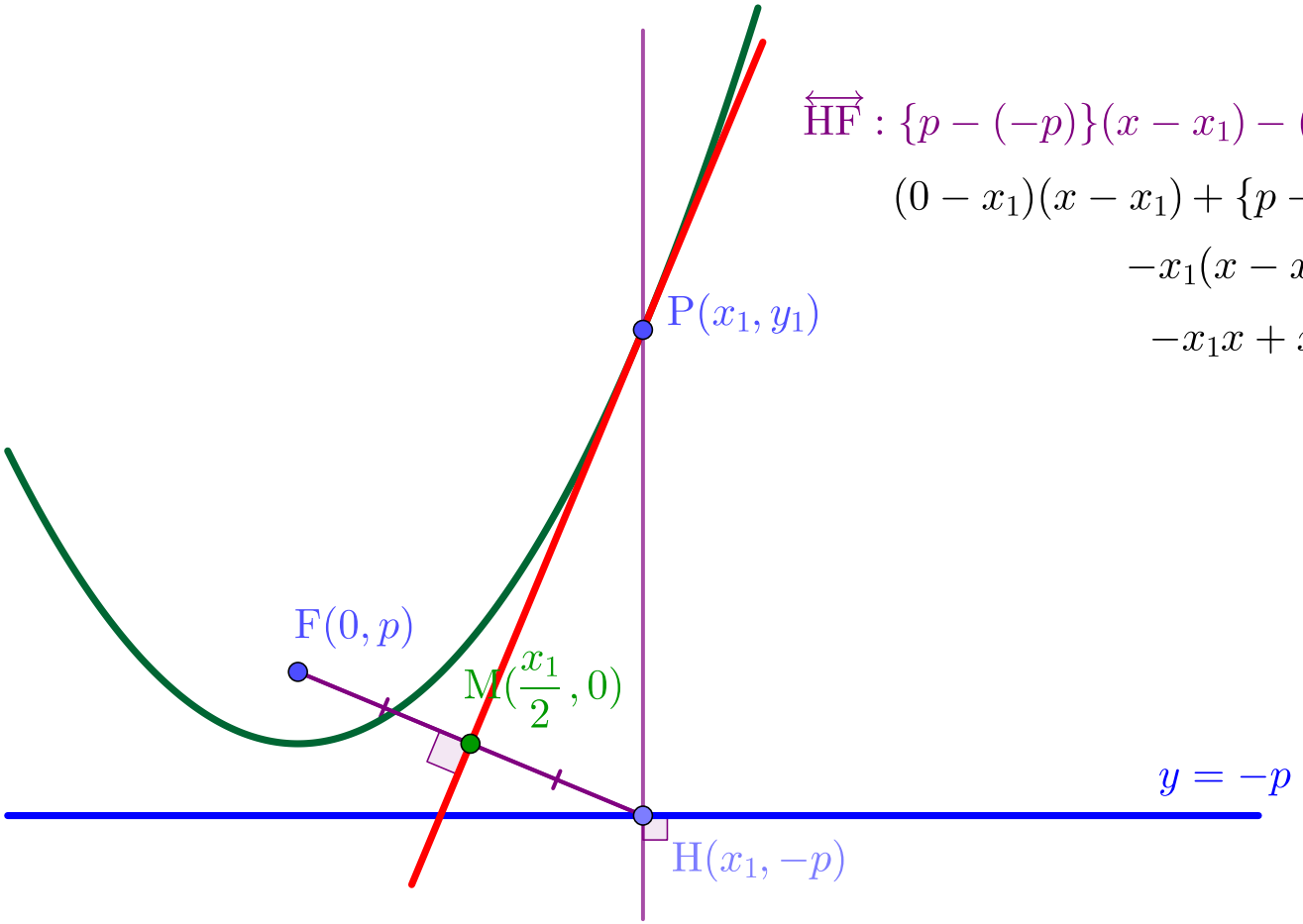

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$$-x_1x+x_1^2+2py-2py_1=0$$

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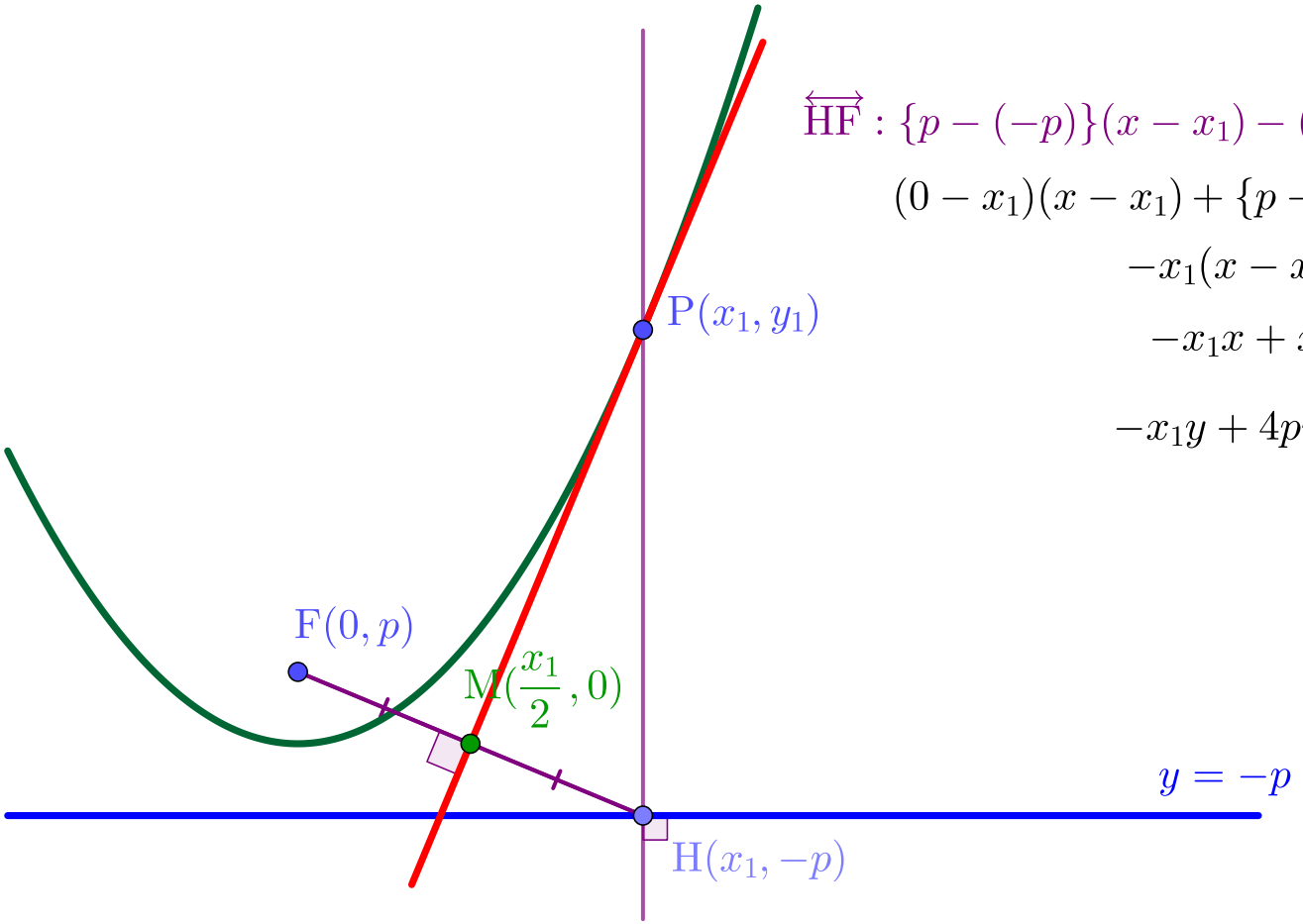

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$$-x_1y+4py_1+2py-2py_1=0$$

$$(\because x_1^2=4py_1)$$

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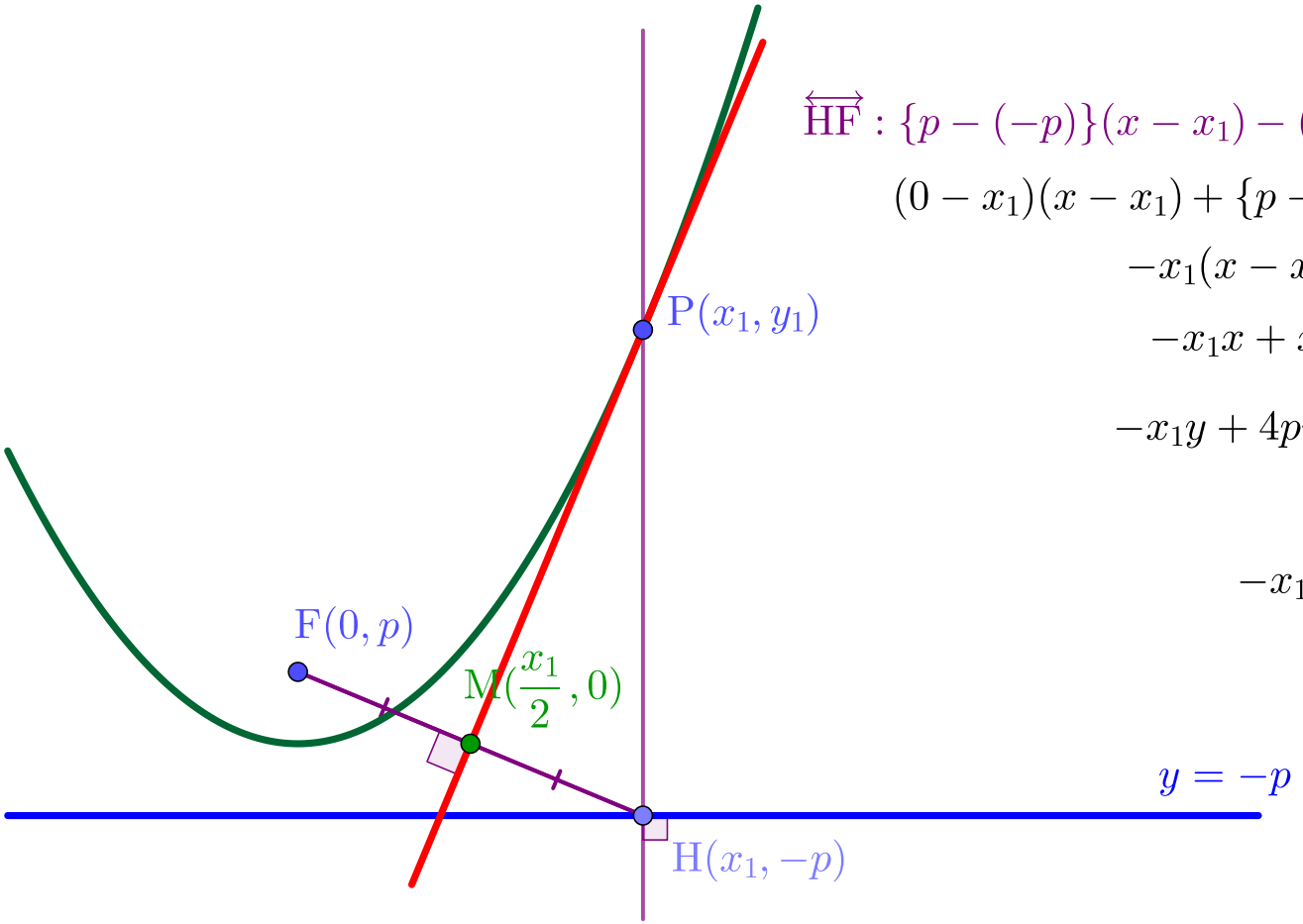

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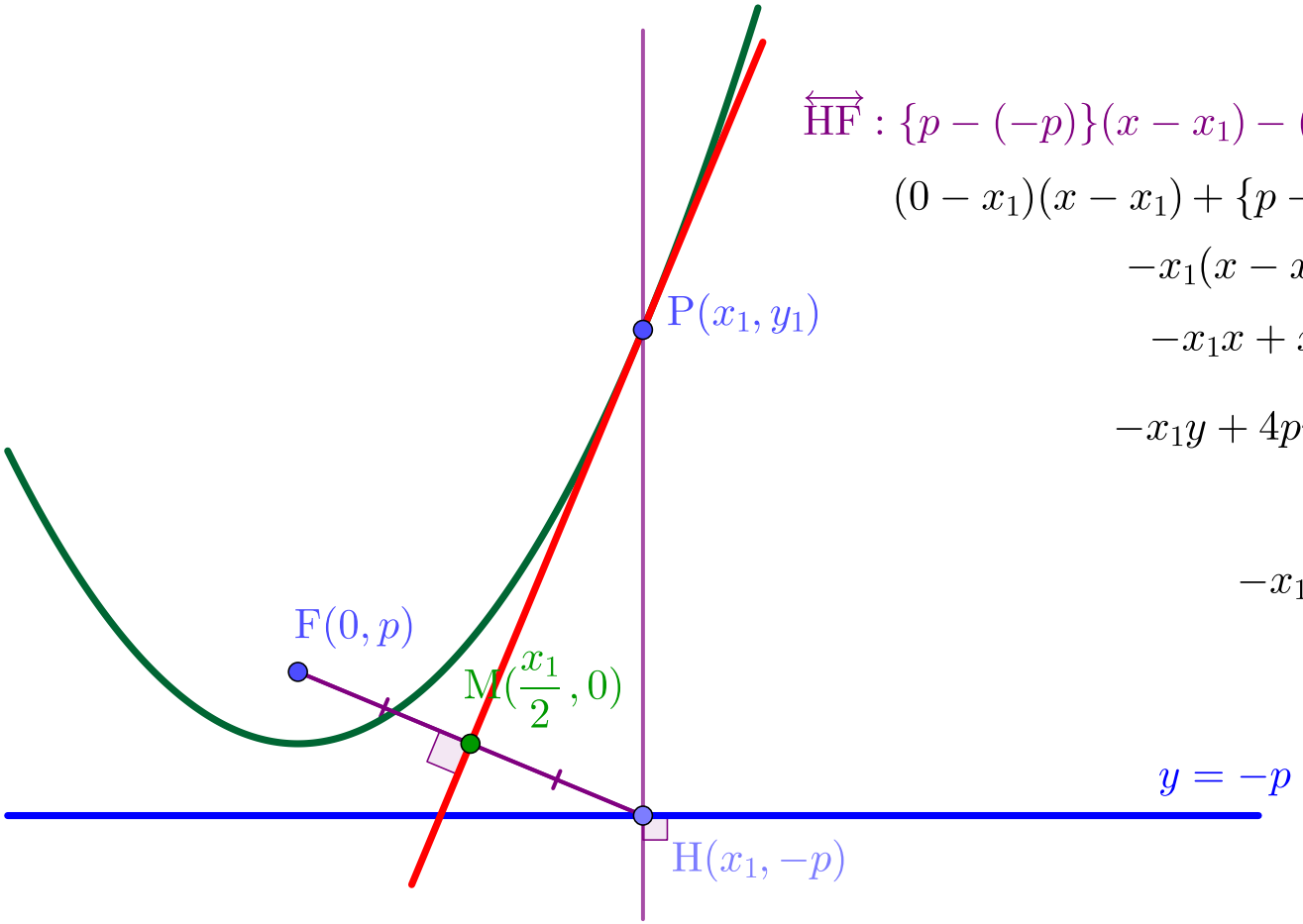

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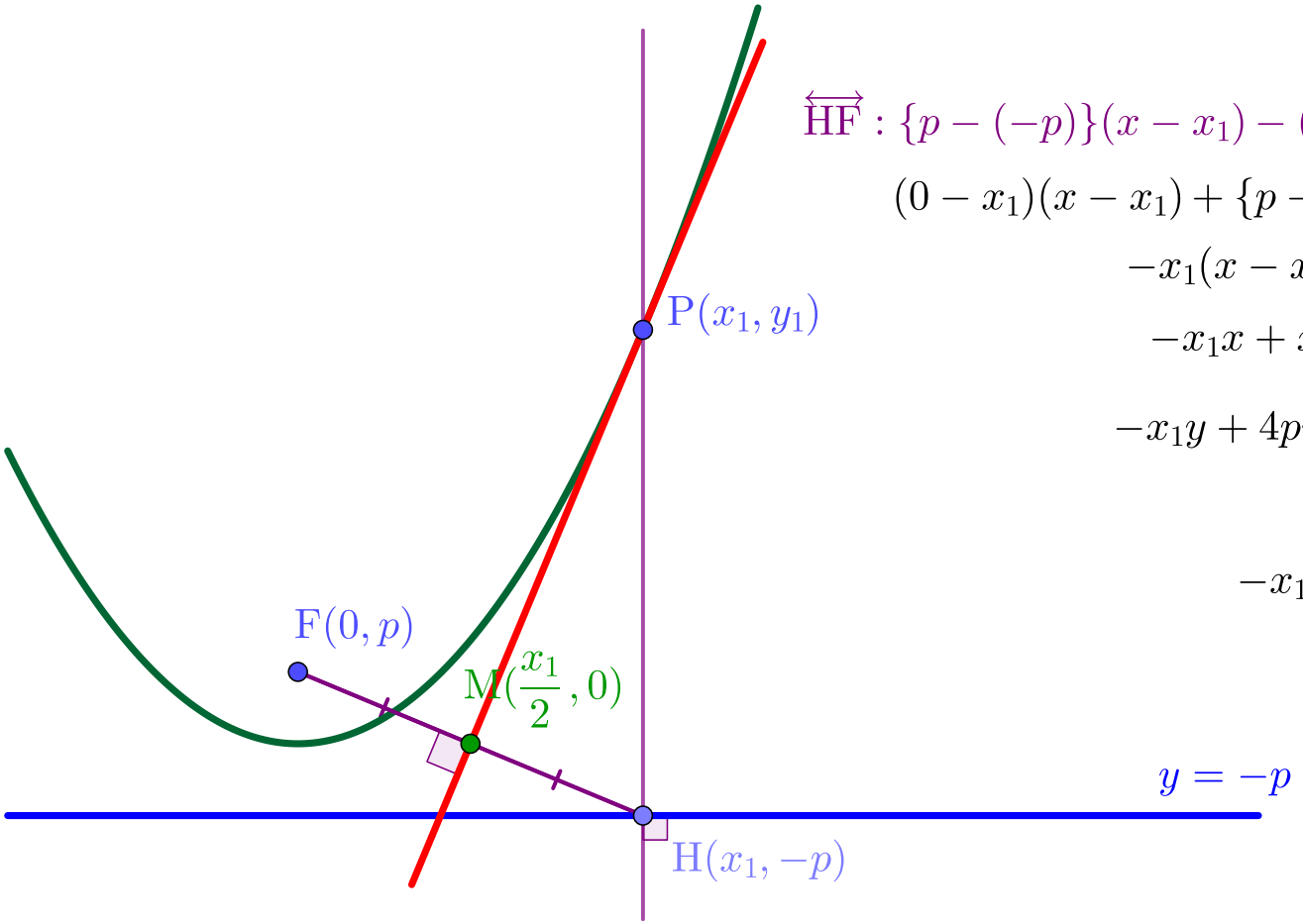

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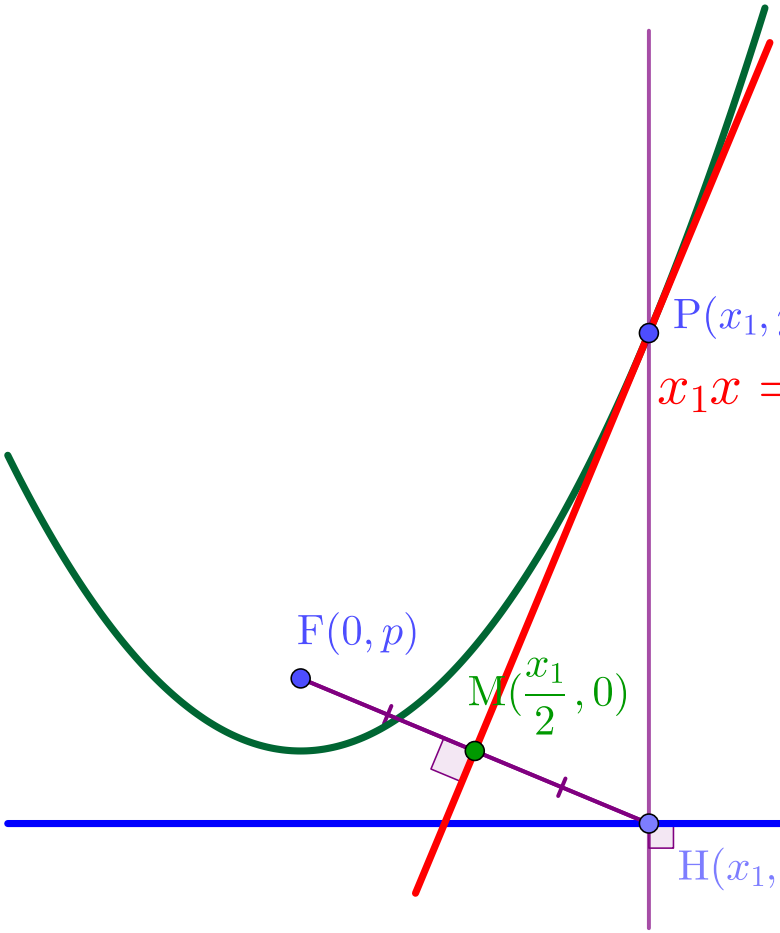

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$$-x_1(x-x_1) + 2p(y-y_1) = 0$$

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$$-x_1x + 2py + 2py_1 = 0$$

$$2py + 2py_1 = x_1x$$

$$2p(y + y_1) = x_1x$$

$$\therefore y_1y = 2p(x + x_1)$$

When a directrix is $y = -p$ and a focus is $(0, p)$, find the equation for the tangent line to the parabola at a given point (x_1, y_1).[Geometric Approach]

Github:
https://min7014.github.io/math20220320001.html

Click or paste URL into the URL search bar, and you can see a picture moving.