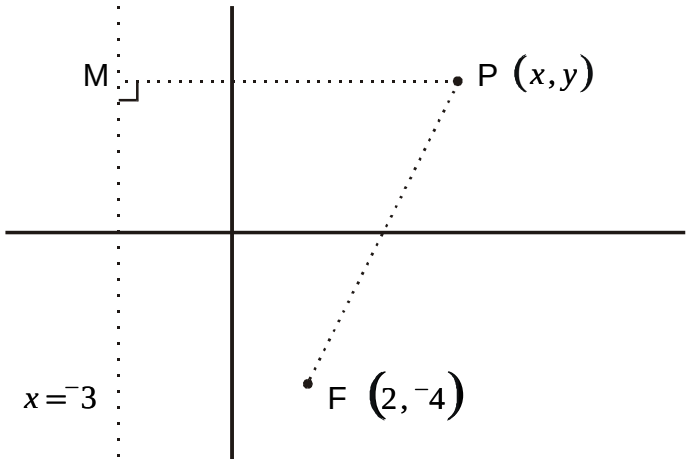
Finding the equation of a conic section by the locus method

- Example - parabola with focus $(2, {}^{-}4)$ and directrix $x = {}^{-}3$.



$$e = \frac{\text{PF}}{\text{PM}}$$
$$1 = \frac{\text{PF}}{\text{PM}}$$
$$\text{PM} = \text{PF}$$
$$x + 3 = \sqrt{(x-2)^2 + (y - {}^{-}4)^2}$$
$$(x+3)^2 = (x-2)^2 + (y+4)^2$$
$$x^2 + 6x + 9 = x^2 - 4x + 4 + y^2 + 8y + 16$$
$$10x = y^2 + 8y + 11$$

- Example - hyperbola with focus $(2, {}^{-}4)$, directrix $x = {}^{-}3$ and eccentricity 2.

$$e = \frac{\text{PF}}{\text{PM}}$$
$$2 = \frac{\text{PF}}{\text{PM}}$$
$$2(\text{PM}) = \text{PF}$$
$$2(x+3) = \sqrt{(x-2)^2 + (y - {}^{-}4)^2}$$
$$4(x+3)^2 = (x-2)^2 + (y+4)^2$$
$$4x^2 + 24x + 36 = x^2 - 4x + 4 + y^2 + 8y + 16$$
$$3x^2 + 28x - y^2 - 8y + 16 = 0$$