

Factor

$$12x^2(4x^2 + 5x - 9) - 4xy(4x^2 + 5x - 9) - y^2(4x^2 + 5x - 9)$$

Always common factor first, if possible

$$(4x^2 + 5x - 9)(12x^2 - 4xy - y^2)$$

= . . .

$$4x^2 + 5x - 9$$

$$\begin{cases} p = -36 \\ s = 5 \end{cases}$$

$$= \underbrace{4x^2 + 9x}_{} - \underbrace{4x - 9}_{}$$

$$= x(4x + 9) - (4x + 9)$$

$$= (4x + 9)(x - 1)$$

$$\begin{aligned} 12x^2 - 4xy - y^2 \\ &= 12x^2 - 6xy + 2xy - y^2 \\ &= 6x(2x - y) + y(2x - y) \\ &= (2x - y)(6x + y) \end{aligned}$$

Answer: $(4x + 9)(x - 1)(2x - y)(6x + y)$