

Factor completely.

CASE 1: GCF

$$5c^5y^3 + 10c^4y^2 - 20c^3y$$

$$5c^3y^2(cy + 2 - 4c^4y)$$

$$\begin{aligned} 2(x+3z)^4 - 5w(x+3z)^2 &= (x+3z)^2 [2(x+3z)^2 - 5w] \\ &= (x+3z)(2-5w) \end{aligned}$$

CASE 2: Difference of 2 Squares

$$81x^2 - 4 = (9x)^2 - (2)^2$$

$$= (9x - 2)(9x + 2)$$

$$81x^{12} - 4y^{40} = (9x^6)^2 - (2y^{20})^2$$

$$= (9x^6 - 2y^{20})(9x^6 + 2y^{20})$$

CASE 3: *split the middle factoring or g+c*

$$8x^2 + 10x - 3$$

$$8x^2 + 12x - 2x - 3$$

$$= 4x(2x+3) - 1(2x+3)$$

$$= (2x+3)(4x-1)$$

$$8x^2 + 10xy - 3y^2$$

$$8x^2 + 12xy - 2xy - 3y^2$$

$$4x(2x+3y) - y(2x+3y)$$

$$(2x+3y)(4x-y)$$

$$-24$$

$$\wedge$$

$$12 \quad -2$$

$$-24x^2y^2$$

$$\wedge$$

$$12xy \quad -2xy$$

CASE 4: $4x^2 - 5x + 7$

prime

$$28$$

$$\wedge$$