

Factoring by Decomposition

$$ax^2 + bx + c$$

↑
 $a > 1$

$$x^2 + 5x + 4$$

add/multiply

$$2x^2 - 16$$

GCF

1) $3p^2 - 2p - 5$

multiply

add $\rightarrow -2$
 multiply $\rightarrow -15$

$3 \quad -5$

$$(3p^2 + 3p)(-5p - 5)$$

$$3p(p+1) - 5(p+1)$$

$$(3p-5)(p+1)$$

Check:

$$(3p-5)(p+1)$$

$$3p(p+1) - 5(p+1)$$

$$3p^2 + 3p - 5p - 5$$

$$3p^2 - 2p - 5$$

$$2) \quad 2n^2 + 3n - 9$$

$$\begin{array}{l} \text{add} \rightarrow 3 \\ \text{mult} \rightarrow -18 \\ \hline 6n - 3 \end{array}$$

$$\begin{array}{r} 18 \\ \hline 1 \quad 18 \\ 2 \quad 9 \\ 3 \quad 6 \end{array}$$

$$(2n^2 + 6n)(-3n - 9)$$

$$2n(n+3) - 3(n+3)$$

$$(2n-3)(n+3)$$

$$3) \quad 3n^2 - 8n + 4$$

$$\begin{array}{l} \text{add} \rightarrow -8 \\ \text{mult} \rightarrow 12 \\ \hline -6n - 2 \end{array}$$

$$(3n^2 - 6n)(-2n + 4)$$

$$3n(n-2) - 2(n-2)$$

$$(3n-2)(n-2)$$

$$4) \quad 5n^2 + 19n + 12$$

$$\begin{array}{l} \text{add} \rightarrow 19 \\ \text{multiply} \rightarrow 60 \\ \hline 4n + 15 \end{array}$$

$$\begin{array}{r} 60 \\ \hline 1 \quad 60 \\ 2 \quad 30 \\ 3 \quad 20 \\ 4 \quad 15 \\ 5 \quad 12 \\ 6 \quad 10 \end{array}$$

$$(5n^2 + 15n)(4n + 12)$$

