

Factoring Practice

Factor each completely.

1) $4x^4 - 32x^3 - 36x^2$

$4x^2(x^2 - 8x - 9)$

$$\begin{array}{r} x \\ \times \begin{array}{|c|c|} \hline x^2 & x \\ \hline -9 & \end{array} \\ \hline -9x & -9 \end{array}$$

$$\begin{array}{r} -9 \\ \hline \begin{array}{|c|c|} \hline 1 & -9 \\ \hline 3 & \end{array} \\ \hline -3 \end{array}$$

$4x^2(x+1)(x-9)$

3) $k^2 + 4k$

$k(k+4)$

2) $v^3 + 6v^2 - 7v$

$$\begin{array}{r} v(v^2 + 6v - 7) \\ v \quad \downarrow \\ v \begin{array}{|c|c|} \hline v^2 & -v \\ \hline 7 & \end{array} \\ \hline 7v & -7 \end{array}$$

$$\begin{array}{r} -7 \\ \hline \begin{array}{|c|c|} \hline -1 & 7 \\ \hline \end{array} \\ \hline \end{array}$$

$v(v+7)(v-1)$

4) $k^4 - 12k^3 + 20k^2$

$k^2(k^2 - 12k + 20)$

$$\begin{array}{r} k \quad -2 \\ \hline k \begin{array}{|c|c|} \hline k^2 & -2k \\ \hline -10k & \end{array} \\ \hline -10 \end{array}$$

$$\begin{array}{r} 20 \\ -1 \quad -20 \\ \hline -2 \quad -10 \\ \hline -4 \quad -5 \end{array}$$

$k^2(k-2)(k-10)$

5) $3x^4 + 7x^3 - 40x^2$

$x^2(3x^2 + 7x - 40)$

$$\begin{array}{r} 3x \quad -8 \\ \times \begin{array}{|c|c|} \hline 3x^2 & -8x \\ \hline 5 & \end{array} \\ \hline 15x \quad -40 \end{array}$$

$x^2(x+5)(3x-8)$

$$\begin{array}{r} -120 \\ \hline -1 \quad 120 \\ -2 \quad 60 \\ -3 \quad 40 \\ -4 \quad 30 \\ -5 \quad 24 \\ -6 \quad 20 \\ -8 \quad 15 \\ \hline -10 \quad 12 \end{array}$$

7) $7v^2 - 2v - 9$

$$\begin{array}{r} v \quad 1 \\ \times \begin{array}{|c|c|} \hline 7v^2 & 7v \\ \hline -9v & -9 \end{array} \\ \hline \end{array}$$

$$\begin{array}{r} -63 \\ \hline 1 \quad -63 \\ 3 \quad -21 \\ \hline 7 \quad -9 \end{array}$$

$(7v-9)(v+1)$

6) $21b^2 - 183b - 270$

$3(7b^2 - 61b - 90)$

$$\begin{array}{r} 7b \quad 9 \\ \hline b \begin{array}{|c|c|} \hline 7b^2 & 9b \\ \hline -70b & -90 \end{array} \\ \hline -10 \end{array}$$

$3(b-10)(7b+9)$

8) $5x^2 + 3x - 2$

$$\begin{array}{r} 5x \quad -2 \\ \hline x \begin{array}{|c|c|} \hline 5x^2 & -2x \\ \hline 5 & \end{array} \\ \hline 1 \quad 5x \quad -2 \end{array}$$

$$\begin{array}{r} -10 \\ \hline -1 \quad 10 \\ -2 \quad 5 \\ \hline \end{array}$$

$(5x-2)(x+1)$

	-630
1	-630
2	-315
3	-210
5	-106
6	-105
7	-90
9	-70
10	-63
14	-45
15	-42
18	-35

$$9) 48v^2 - 204v - 54$$

$$6(8v^2 - 34v - 9)$$

$$\begin{array}{c} 4v \quad 1 \\ \begin{array}{|c|c|} \hline 2v & 8v^2 & 2v \\ \hline & -36v & -9 \\ \hline \end{array} \end{array}$$

$$(6(2v-9)(4v+1))$$

$$\begin{array}{r} -72 \\ \hline 1 & -72 \\ 2 & -36 \\ \hline 3 & -24 \\ 6 & -12 \\ 8 & -9 \\ \hline \end{array}$$

$$10) 4v^4 - 25v^3 + 36v^2$$

$$v^2(4v^2 - 25v + 36)$$

$$\begin{array}{c} 4v \quad -9 \\ \begin{array}{|c|c|} \hline v & 4v^2 & -9v \\ \hline & -16v & 36 \\ \hline \end{array} \end{array}$$

$$v^2(v-4)(4v-9)$$

$$\begin{array}{r} 144 \\ \hline -1 & -144 \\ -2 & -72 \\ -3 & -46 \\ -4 & -36 \\ -6 & -24 \\ -8 & -18 \\ -9 & -16 \\ \hline -12 & -12 \end{array}$$

$$11) 6x^2 + 13x + 6$$

$$\begin{array}{c} 3x \quad 2 \\ \begin{array}{|c|c|} \hline 2x & 6x^2 & 4x \\ \hline 3 & 9x & 6 \\ \hline \end{array} \end{array}$$

$$(3x+2)(2x+3)$$

$$\begin{array}{r} 36 \\ \hline 1 & 36 \\ 2 & 18 \\ 3 & 12 \\ 4 & 9 \\ 6 & 6 \\ \hline \end{array}$$

$$12) 9v^2 + 88v + 63$$

$$\begin{array}{c} -9v \quad 7 \\ \begin{array}{|c|c|} \hline v & 9v^2 & 7v \\ \hline 9 & 81v & 63 \\ \hline \end{array} \end{array}$$

$$(9v+7)(v+9)$$

$$\begin{array}{r} 567 \\ \hline 1 & 567 \\ 3 & 189 \\ 7 & 81 \\ 9 & 63 \\ 21 & 27 \\ \hline \end{array}$$

$$13) 3m^2 + 19mn - 14n^2$$

$$\begin{array}{c} 3m \quad -2n \\ \begin{array}{|c|c|} \hline m & 3m^2 & -2mn \\ \hline 7n & 21mn & -14n^2 \\ \hline \end{array} \end{array}$$

$$(3m-2n)(m+7n)$$

$$\begin{array}{r} -42 \\ \hline -1 & 42 \\ -2 & 21 \\ -3 & 14 \\ -6 & 7 \\ \hline \end{array}$$

$$14) 7x^2 + 61xy + 40y^2$$

$$\begin{array}{c} 7x \quad 5y \\ \begin{array}{|c|c|} \hline x & 7x^2 & 5xy \\ \hline 8y & 56xy & 40y^2 \\ \hline \end{array} \end{array}$$

$$\begin{array}{r} 280 \\ \hline 1 & 280 \\ 2 & 140 \\ 4 & 70 \\ 5 & 56 \\ 7 & 40 \\ 8 & 35 \\ 10 & 28 \\ 14 & 20 \\ \hline \end{array}$$

$$15) 5m^2 + 47mn + 56n^2$$

$$\begin{array}{c} 5m \quad 7n \\ \begin{array}{|c|c|} \hline m & 5m^2 & 7mn \\ \hline 8n & 40mn & 56n^2 \\ \hline \end{array} \end{array}$$

$$(5m+7n)(m+8n)$$

$$\begin{array}{r} 280 \\ \hline 1 & 280 \\ 2 & 140 \\ 4 & 70 \\ 5 & 56 \\ 7 & 40 \\ 8 & 35 \\ 10 & 28 \\ 14 & 20 \\ \hline \end{array}$$

$$16) 5a^2 - 22ab + 8b^2$$

$$\begin{array}{c} 5a \quad 2b \\ \begin{array}{|c|c|} \hline a & 5a^2 & -2ab \\ \hline 4b & -20ab & 8b^2 \\ \hline \end{array} \end{array}$$

$$\begin{array}{r} 40 \\ \hline -1 & 40 \\ -2 & -20 \\ -4 & -10 \\ -5 & -8 \\ \hline \end{array}$$

$$(a+4b)(5a+2b)$$