

## Factoring Quadratic Expressions

Factor each completely.

1)  $x^2 - 7x - 18$

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

2)  $p^2 - 5p - 14$

$$(p - 7)(p + 2)$$

3)  $m^2 - 9m + 8$

$$(m - 8)(m - 1)$$

4)  $x^2 - 16x + 63$

$$(x - 9)(x - 7)$$

5)  $7x^2 - 31x - 20$        $-140$

$$7x^2 - 35x \mid + 4x - 20 \quad \begin{matrix} -140 \\ \wedge \\ -35 \cdot 4 \end{matrix}$$

$$7x(x - 5) + 4(x - 5)$$

$$(7x + 4)(x - 5)$$

6)  $7k^2 + 9k$

$$k(7k + 9)$$

7)  $7x^2 - 45x - 28$        $-196$

$$7x^2 - 49x \mid + 4x - 28 \quad \begin{matrix} -196 \\ \wedge \\ -49 \cdot 4 \end{matrix}$$

$$7x(x - 7) + 4(x - 7)$$

$$(7x + 4)(x - 7)$$

8)  $2b^2 + 17b + 21$        $42$

$$2b^2 + 14b \mid + 3b + 21 \quad \begin{matrix} 42 \\ \wedge \\ 14 \cdot 3 \end{matrix}$$

$$2b(b + 7) + 3(b + 7)$$

$$(2b + 3)(b + 7)$$

9)  $5p^2 - p - 18$        $-90$

$$5p^2 - 10p \mid + 9p - 18 \quad \begin{matrix} -90 \\ \wedge \\ -10 \cdot 9 \end{matrix}$$

$$5p(p - 2) + 9(p - 2)$$

$$(5p + 9)(p - 2)$$

10)  $28n^4 + 16n^3 - 80n^2$        $-140$

$$4n^2 [7n^2 + 4n - 20]$$

$$4n^2 [7n^2 + 14n \mid - 10n - 20]$$

$$4n^2 [7n(n + 2) - 10(n + 2)]$$

$$4n^2 (7n - 10)(n + 2)$$

$$\begin{matrix} -140 \\ \wedge \\ 14 \cdot -10 \end{matrix}$$

$$11) 3b^3 - 5b^2 + 2b$$

$$b [3b^2 - 5b + 2]$$

$$\begin{matrix} 6 \\ \wedge \\ -3 \cdot -2 \end{matrix}$$

$$b [3b^2 - 3b | -2b + 2]$$

$$b [3b(b-1) - 2(b-1)]$$

$$\boxed{b(3b-2)(b-1)}$$

$$13) 30n^2b - 87nb + 30b$$

$$3b [10n^2 - 29n + 10]$$

$$\begin{matrix} 100 \\ \wedge \\ -25 \cdot -4 \end{matrix}$$

$$3b [10n^2 - 25n | -4n + 10]$$

$$3b [5n(2n-5) - 2(2n-5)]$$

$$\boxed{3b(5n-2)(2n-5)}$$

$$15) 9p^2r + 73pr + 70r$$

$$r [9p^2 + 73p + 70]$$

$$\begin{matrix} 630 \\ \wedge \\ 63 \cdot 10 \end{matrix}$$

$$r [9p^2 + 63p | +10p + 70]$$

$$r [9p(p+7) + 10(p+7)]$$

$$\boxed{r(9p+10)(p+7)}$$

$$17) 4x^3 + 43x^2 + 30x$$

$$x [4x^2 + 43x + 30]$$

$$\begin{matrix} 120 \\ \wedge \\ 40 \cdot 3 \end{matrix}$$

$$x [4x^2 + 40x | +3x + 30]$$

$$x [4x(x+10) + 3(x+10)]$$

$$\boxed{x(4x+3)(x+10)}$$

### Critical thinking questions:

19) For what values of  $b$  is the expression factorable?

$$x^2 + bx + 12$$

$$\boxed{b = 7, 8, 13}$$

$$12) 7x^2 - 32x - 60$$

$$-420$$

$$7x^2 - 42x | +10x - 60$$

$$\begin{matrix} -420 \\ \wedge \\ -42 \cdot 10 \end{matrix}$$

$$7x(x-6) + 10(x-6)$$

$$\boxed{(7x+10)(x-6)}$$

$$14) 9r^2 - 5r - 10$$

Not factorable

$$16) 9x^2 + 7x - 56$$

Not factorable

$$18) 10m^2 + 89m - 9$$

$$-90$$

$$10m^2 + 90m | -m - 9$$

$$\begin{matrix} -90 \\ \wedge \\ 90 \cdot -1 \end{matrix}$$

$$10m(m+9) - 1(m+9)$$

$$\boxed{(10m-1)(m+9)}$$

20) Name four values of  $b$  which make the expression factorable:

$$x^2 - 3x + b$$

$$\boxed{b = 2, -4, -10, -18}$$