PRACTICE DRILL 21—FOILING (UPPER LEVEL ONLY)

1. $(x + 4)(x + 3)$
2. $(x - 4)(x - 3)$
3. $(x + 4)(x - 3)$
4. $(a + b)(a - b)$
5. $(a + b)(a + b)$
6. $(a - b)(a - b)$
7. If $x^2 + y^2 = 53$, and $xy = 14$, what is the value of $(x - y)^2$?

Factor the following expressions:

8. $x^2 + 13x + 42$
9. $y^2 - 3y - 10$
10. $x^2 - 12x + 35$
11. $y^2 + 11x + 24$
12. $a^2 - 5a - 14$
13. $b^2 - 11b + 30$
14. $k^2 + 16k + 63$

Practice Drill 21—Foiling

1. $x^2 + 7x + 12$

   FOIL: $x \times x = x^2$, $x \times 3 = 3x$, $4 \times x = 4x$, and $3 \times 4 = 12$. Add all these together to find that $x^2 + 3x + 4x + 12 = x^2 + 7x + 12$.

2. $x^2 - 7x + 12$

   FOIL: $x \times x = x^2$, $x \times -3 = -3x$, $-4 \times x = -4x$, and $-3 \times -4 = 12$. Add all these together to find that $x^2 - 3x - 4x + 12 = x^2 - 7x + 12$.

3. $x^2 + x - 12$

   FOIL: $x \times x = x^2$, $x \times -3 = -3x$, $4 \times x = 4x$, and $-3 \times 4 = -12$. Add all these together to find that $x^2 - 3x + 4x - 12 = x^2 + x - 12$.

4. $a^2 - b^2$

   FOIL: $a \times a = a^2$, $a \times -b = -ab$, $a \times b = ab$, and $-b \times b = -b^2$. Add all these together to find that $a^2 + ab - ab - b^2 = a^2 - b^2$.

5. $a^2 + 2ab + b^2$

   FOIL: $a \times a = a^2$, $a \times b = ab$, $a \times b = ab$, and $b \times b = b^2$. Add all these together to find that $a^2 + ab + ab + b^2 = a^2 + 2ab + b^2$.

6. $a^2 - 2ab + b^2$

   FOIL: $a \times a = a^2$, $a \times -b = -ab$, $-a \times b = -ab$, and $-b \times -b = b^2$. Add all these together to find that $a^2 - ab - ab + b^2 = a^2 - 2ab + b^2$.

7. 25

   FOIL out $(x - y)^2$ to find $x^2 - 2xy + y^2$. Since $x^2 + y^2 = 53$, substitute 53 to find $53 - 2xy$. Substitute 14 in for xy: $53 - 2(14) = 53 - 28 = 25$.

8. $(x + 6)(x + 7)$

   Factor into two binomials. Since x^2 is the first term and both signs are positive, place an $x$and an addition sign in each of the binomial parentheses to find $(x + \quad)(x + \quad)$. Now, find two factors of 42 that also add up to 13. 6 and 7 work, and since both binomials contain addition signs, the order does not matter.

9. $(y + 2)(y - 5)$

   Factor into two binomials. Since y^2 is the first term and the signs are opposite, place a $y$and opposite signs in each of the binomial parentheses to make $(y + \quad)(y - \quad)$. Now, find two factors of 10 that also add up to -3. 2 and -5 work, so place 2 in the binomial with the addition sign and 5 next to the subtraction sign.

10. $(x - 5)(x - 7)$

Factor into two binomials. Since x^2 is the first term and both signs are negative, place an $x$and a subtraction sign in each of the binomial parentheses to make $(x - \quad)(x - \quad)$. Now, find two factors of 35 that also add up to 12. 5 and 7 work, and since both binomials contain subtraction signs, the order does not matter.

11. $(y + 8)(y + 3)$

Factor into two binomials. Since y^2 is the first term and both signs are positive, place a $y$and an addition sign in each of the binomial parentheses to find $(y + \quad)(y + \quad)$. Now, find two factors of 24 that also add up to 11. 3 and 8 work, and since both binomials contain addition signs, the order does not matter.

12. $(a + 2)(a - 7)$

Factor into two binomials. Since a^2 is the first term and the signs are opposite, place an $a$and opposite signs in each of the binomial parentheses to make $(a + \quad)(a - \quad)$. Now, find two factors of 14 that also add up to -5. 2 and -7 work, so place 2 in the binomial with the addition sign and 7 next to the subtraction sign.

13. $(b - 5)(b - 6)$

Factor into two binomials. Since b^2 is the first term and both signs are negative, place a $b$and a subtraction sign in each of the binomial parentheses to make $(b - \quad)(b - \quad)$. Now, find two factors of 30 that also add up to 11. 5 and 6 work, and since both binomials contain subtraction signs, the order does not matter.

14. $(k + 9)(k + 7)$

Factor into two binomials. Since k^2 is the first term and both signs are positive, place a $k$and an addition sign in each of the binomial parentheses to find $(k + \quad)(k + \quad)$. Now, find two factors of 63 that also add up to 16. 9 and 7 work, and since both binomials contain addition signs, the order does not matter.