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SECTION 5.6: Special Polynomial Products (p. 387 – 395)

- ☐ The FOIL Method (p. 387)
- ☐ The Difference of Squares (p. 389)
- ☐ The Square of a Binomial (p. 390)
- ☐ Perfect Square Trinomial (p. 390)
- ☐ Tips for Multiplying Two Polynomials (p. 392)

Multiply each of the following. Show all steps.

1. $(1+i)^2$

$$= (1+i)\cdot(1+i)$$
$$= 1\cdot(1+i) + i\cdot(1+i)$$
$$= 1 + i + i + i^2$$
$$= \boxed{1 + 2i + i^2}$$

2. $(r-2)(r+2)$

$$= r\cdot(r+2) - 2\cdot(r+2)$$
$$= r^2 + 2r - 2r - 4$$
$$= \boxed{r^2 - 4}$$

3. $(t-5)^2$

$$= (t-5)\cdot(t-5)$$
$$= t\cdot(t-5) - 5\cdot(t-5)$$
$$= t^2 - 5t - 5t + 25$$
$$= \boxed{t^2 - 10t + 25}$$

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4. $(4x-5)(4x+5)$ $= 4x(4x+5) - 5\cdot(4x+5)$

$= 16x^2 + 20x - 20x - 25$

$= \boxed{16x^2 - 25}$

SECTION 6.4: Special Polynomial Products (p. 466 – 474)

- □ Perfect Square Trinomial (p. 466)
- □ To Recognize a Perfect Square Trinomial (p. 466)
- □ Factoring Perfect Square Trinomials (p. 467)
- □ To Recognize the Difference of Squares (p. 468)
- □ Factoring a Difference of Squares (p. 468)
- □ Connecting the Concepts: Algebraic and Graphical Methods (p. 472)

Solve each of the following. Show all steps.

5. $t^2 + 18t = -81$ $\Rightarrow t^2 + 18t + 81 = 0$

$a=1$, $b=18$, $c=81$

Side Note:

Multiply

81

9 9

18

Add

$\Rightarrow 18t = 9t + 9t$

$\Rightarrow t^2 + 9t + 9t + 36 = 0$

$\Rightarrow t(t+9) + 9(t+9) = 0$

$\Rightarrow (t+9)\cdot(t+9) = 0$

$\Rightarrow t+9=0$ $\Rightarrow$ $\boxed{t=-9}$

6. $x^2 = 25$

$\Rightarrow x^2 - 25 = 0$

$a=1$, $b=0$, $c=-25$

Side Note:

Multiply

-25

-5 +5

0

Add

$0 = -5x + 5x$

$\Rightarrow x^2 - 5x + 5x - 25 = 0$

$\Rightarrow x(x-5) + 5\cdot(x-5) = 0$

$\Rightarrow (x+5)\cdot(x-5) = 0$

$\Rightarrow x+5 = 0$ or $x-5 = 0$ $\Rightarrow$ $\boxed{x=-5}$ or $\boxed{x=5}$

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7. $a^2 + 64 = 16a$ $\Rightarrow$ $a^2 - 16a + 64 = 0$

$a=1,\ b=-16,\ c=64$

Multiply

64

-8 -8

-16

Add

$-16a = -8a - 8a$

$\Rightarrow a^2 - 8a - 8a + 64 = 0$

$\Rightarrow a \cdot (a-8) - 8 \cdot (a-8) = 0$

$\Rightarrow (a-8) \cdot (a-8) = 0$

$\Rightarrow a - 8 = 0 \Rightarrow \boxed{a = 8}$

8. $25y^2 - 64 = 0$ $\Rightarrow$ $(5y)^2 - (8)^2 = 0$

Difference of Square

$(A-B) \cdot (A+B)$

$\Rightarrow (5y - 8) \cdot (5y + 8) = 0$

$\Rightarrow 5y - 8 = 0$ or $5y + 8 = 0$

$\Rightarrow 5y = 8$ or $5y = -8$

$\Rightarrow \boxed{y = 8/5}$ or $\boxed{y = -8/5}$

9. $2b^2 - b = 21$

$a=2,\ b=-1,\ c=-21$

Multiply

-42

-7 +6

-1

Add

$\Rightarrow -b = 6b - 7b$

$\Rightarrow 2b^2 - b - 21 = 0$

$\Rightarrow 2b^2 + 6b - 7b - 21 = 0$

$\Rightarrow 2b \cdot (b+3) - 7 \cdot (b+3) = 0$

$\Rightarrow (2b - 7) \cdot (b+3) = 0$

$\Rightarrow 2b - 7 = 0$ or $b + 3 = 0$

$\Rightarrow \boxed{b = 7/2}$ or $\boxed{b = -3}$

9. Consider the equation

$$x^2 - x - 6 = x - 3.$$

Solve this equation using two different methods:

A. An algebraic technique.

$x^2 - x - 6 = x - 3$

$\Rightarrow x^2 - 2x - 3 = 0$

$a = 1,\ b = -2,\ c = -3$

$\Rightarrow x^2 - 3x + x - 3 = 0$

$\Rightarrow x \cdot (x-3) + 1 \cdot (x-3) = 0$

Multiply

-3

-3 +1

-2

Add

$-2x = -3x + x$

$\Rightarrow (x+1) \cdot (x-3) = 0$

$\Rightarrow x + 1 = 0$ OR $x - 3 = 0$

$\Rightarrow \boxed{x = -1}$ or $\boxed{x = 3}$

B. A graphical technique

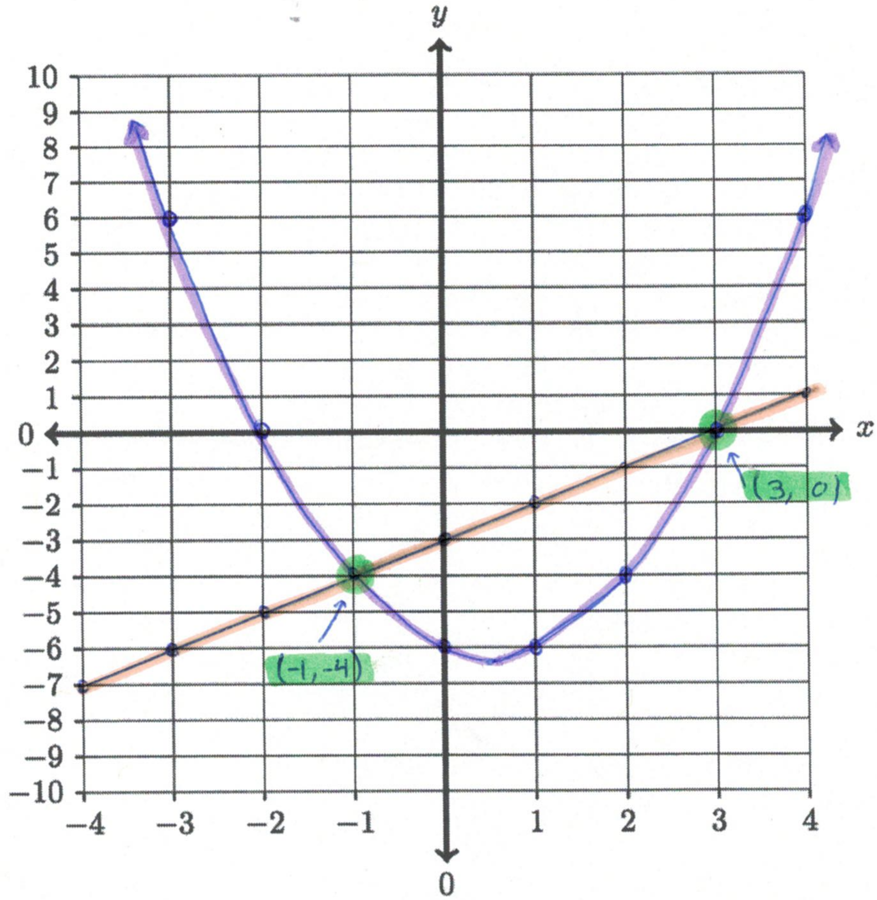
We begin by identifying the functions on the left and right hand sides

$\boxed{y_1 = x^2 - x - 6}$

$\boxed{y_2 = x - 3.}$

Now, we graph these functions:

x	$y_1 = x^2 - x - 6$	$y_2 = x - 3$
-3	6	-6
-2	0	-5
-1	-4	-4
0	-6	-3
1	-6	-2
2	-4	-1
3	0	0
4	6	1



Left point of intersection: $(-1, -4) \Rightarrow \boxed{x = -1}$

Right point of intersection $(3, 0) \Rightarrow \boxed{x = 3}$