SECONDARY MATH 3

**CORE STANDARDS**

A.APR.4

N.CN.8

LESSON

**1-3**

OBJECTIVE **1.** I can use polynomial identities to describe numerical relations.

NOTES

|  |  |
| --- | --- |
| Polynomial Identities | Examples |
| Perfect Square Trinomial$$\left(A+B\right)^{2}=A^{2}+2AB+B^{2}$$ | $$\left(2x-y\right)^{2}=\left(2x\right)^{2}+2\left(2x\right)\left(y\right)+\left(y\right)^{2}$$$$=4x^{2}+4xy+y^{2}$$ |
| Difference of Squares $$\left(A+B\right)\left(A-B\right)=A^{2}-B^{2}$$ | $$\left(3x+4y\right)\left(3x-4y\right)=\left(3x\right)^{2}-\left(4y\right)^{2}$$$$=9x^{2}-16y^{2}$$ |
| Cubic Polynomials$$\left(A+B\right)^{3}=A^{3}+3A^{2}B+3AB^{3}+B^{3}$$$$\left(A-B\right)^{3}=A^{3}-3A^{2}B+3AB^{3}-B^{3}$$ | $$\left(5x+y\right)^{3}=\left(5x\right)^{3}+3\left(5x\right)^{2}\left(y\right)+3\left(5x\right)\left(y\right)^{2}+\left(y\right)^{3}$$$$=125x^{3}+75x^{2}y+15xy^{2}+y^{3}$$$$\left(5x-y\right)^{3}=\left(5x\right)^{3}-3\left(5x\right)^{2}\left(y\right)+3\left(5x\right)\left(y\right)^{2}-\left(y\right)^{3}$$$$=125x^{3}-75x^{2}y+15xy^{2}-y^{3}$$ |
| Sum and Difference of Cubes$$A^{3}+B^{3}=\left(A+B\right)\left(A^{2}-AB+B^{2}\right)$$$$A^{3}-B^{3}=\left(A-B\right)\left(A^{2}+AB+B^{2}\right)$$ | $$8x^{3}+64=\left(2x+4\right)\left[\left(2x\right)^{2}-\left(2x\right)\left(4\right)+\left(4\right)^{2}\right]$$$$=\left(2x+4\right)\left(4x^{2}-8x+16\right)$$$$8x^{3}-64=\left(2x-4\right)\left[\left(2x\right)^{2}+\left(2x\right)\left(4\right)+\left(4\right)^{2}\right]$$$$=\left(2x-4\right)\left(4x^{2}+8x+16\right)$$ |
| Trinomial Leading Coefficient 1$$x^{2}+\left(a+b\right)x+ab=(x+a)(x+b)$$ | $$=x^{2}+\left(-6+2\right)x+\left(-6\right)\left(2\right)$$$$=\left(x-6\right)\left(x+2\right)$$ |
| Quadratic FormulaGiven $ax^{2}+bx+c=0$$$x=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$$ | $2x^{2}+4x-3=0$ $4x^{2}+9=0$$x=\frac{-4\pm \sqrt{4^{2}-4(2)(-3)}}{2(2)}$ $x=\frac{-0\pm \sqrt{0^{2}-4(4)(9)}}{2\left(4\right)}$ $=\frac{-4\pm \sqrt{16+24}}{4}$ $=\frac{\pm \sqrt{-144}}{8}$ $=\frac{-4\pm \sqrt{40}}{4}$ $=\frac{\pm 12i}{8}$ $=\frac{4\pm 2\sqrt{10}}{4}$ $=\frac{\pm 3i}{2}$ $=\frac{2\pm \sqrt{10}}{2}$ |
| Sum of Squares$$A^{2}+B^{2}=\left(A+Bi\right)\left(A-Bi\right)$$ | $$4x^{2}+9=(2x+3i)(2x-3i)$$ |

PRACTICE **1-3** NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 [SHOW YOUR WORK]

Multiply using polynomial identities

1. $\left(x+8\right)\left(x-3\right)$
2. $\left(3x-4y\right)^{2}$
3. $\left(4x-3\right)\left(4x+3\right)$
4. $\left(x-5\right)^{3}$
5. $\left(x+5\right)^{3}$
6. $\left(3x+2\right)\left(9x^{2}-6x+4\right)$
7. $\left(x-11y\right)\left(x^{2}+11xy+121y^{2}\right)$
8. $\left(6x+7\right)^{2}$
9. $\left(4x-2i\right)\left(4x+2i\right)$
10. $\left(13x-8i\right)\left(13x+8i\right)$

Factor the expressions using the polynomial Identities

1. $27x^{3}-y^{3}$
2. $4x^{2}-49$
3. $x^{2}+19x+88$
4. $36x^{2}+60x+25$
5. $144x^{2}+25$
6. $x^{3}+3x^{2}y+3xy^{2}+y^{3}$
7. $81x^{2}-18xy+y^{2}$
8. $9x^{2}+64$
9. $16x^{2}-100y^{2}$
10. $x^{3}+15x^{2}+75x-125$

Use the quadratic formula to sole each equation.

1. $-5x^{2}-2x+3=0$
2. $3x^{2}+7x+2=0$
3. $x^{2}+10x+11=0$
4. $-4x^{2}+3x+1=0$

Factor each expression over the complex numbers.

1. $x^{2}-4x+5$
2. $x^{2}+8x+17$
3. $x^{2}+6$
4. $x^{3}-64$
5. $\left(x^{2}+5x+6\right)\left(x^{2}+4\right)$
6. $x^{2}+8$