Algebra 2 Notes: Section 5.5 Name KEY

Factor Theorem: Remember that if f(a) = 0, then (x – a) is a factor.

In #1-2, write a polynomial with the given zeros.

1. 4, -9

$(x-4)(x+9)$

$x^2+9x-4x-36$

$\boxed{x^2+5x-36}$

2. 3, -4, 5

$(x-3)(x+4)(x-5)$

$(x-3)(x^2-5x+4x-20)$

$(x-3)(x^2-x-20)$

x^3-x^2-20x

$+\quad -3x^2+3x+60$

$\boxed{x^3-4x^2-17x+60}$

3. 2, -2, 1, 6

$(x-2)(x+2)(x-1)(x-6)$

$(x^2-4)(x^2-7x+6)$

$x^4-7x^3+6x^2$

$+\quad -4x^2+28x-24$

$\boxed{x^4-7x^3+2x^2+28x-24}$

- Irrational roots (zeros) and imaginary roots come in conjugate pairs.
- Conjugates are the same expression, just with a different sign (+ or -) in between.
- When using the quadratic formula, you get answers like $(3 \pm \sqrt{2})$ or $(5 \pm 3i)$.
- When solving with square roots, you get answers like $\pm\sqrt{7}$ or $\pm 5i$.
- These are considered conjugate pairs.

In #3-4, suppose that a polynomial has the roots (zeros) listed below. Find two additional roots for the polynomial.

3. $8 + \sqrt{3}$ and -2i

$8-\sqrt{3}$, $-2i$

4. $3 - 5i$ and $\sqrt{7}$

$3+5i$, $-\sqrt{7}$

$\sqrt{6}\cdot\sqrt{6}=\sqrt{36}=6$

In #5-7, find a polynomial equation that has the given roots.

5. -5 and 3i

$-5, 3i, -3i$

$(x+5)(x-3i)(x+3i)$

$(x+5)(x^2-9i^2)$

since $i^2=-1$

$(x+5)(x^2+9)$

$x^3+9x+5x^2+45$

$\boxed{x^3+5x^2+9x+45}$

6. 2 and $-\sqrt{6}$

$2, -\sqrt{6}, +\sqrt{6}$

$(x-2)(x+\sqrt{6})(x-\sqrt{6})$

$(x-2)(x^2-6)$

$x^3-6x-2x^2+12$

$\boxed{x^3-2x^2-6x+12}$

7. 3 + 2i , also $3-2i$

$(x-(3+2i))(x-(3-2i))$

$(x-3-2i)(x-3+2i)$

Distribute 3 times

$x \rightarrow \quad x^2-3x+2xi$

$-3 \rightarrow \quad -3x+9-6i$

$-2i \rightarrow + \quad -2xi+6i-4i^2$

$x^2-6x+9-4i^2$ (xi's cancel, i's cancel)

$i^2=-1$

$x^2-6x+9+4$

$\boxed{x^2-6x+13}$