

Target 2A: Perform arithmetic operations, including adding, subtracting, and multiplying with complex numbers

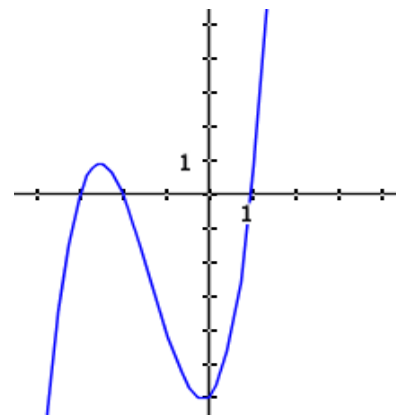
1. Perform the indicated operations $(5 + 3i) + (-7 + 6i) - (15 - 10i)$.

2. Simplify the expression $(3 - 4i)^2$.

Target 2.B: Graph, transform and identify the key features of a polynomial function and make connections between algebraic and graphical forms.

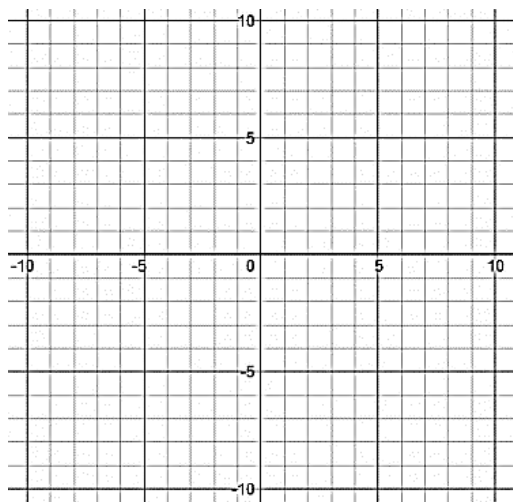
3. Identify the key features that describe the graphed polynomial.

- A. The polynomial has a(n) _____ degree. (even/odd)
- B. The polynomial has _____ zeros. (number of zeros)
- C. The polynomial has _____ maximums and _____ minimums (number of each).
- D. The polynomial has zeros at $x =$ _____, $x =$ _____, $x =$ _____
- E. The polynomial has a factors of (____)(____)(____)



4. Graph a polynomial function with real zeros at $x = -7, -1, 5$, a local minima at approximately $(2, -6)$, a local maxima at approximately $(-3, 5)$, and with the end behavior

$$\lim_{x \rightarrow -\infty} f(x) = -\infty \text{ and } \lim_{x \rightarrow +\infty} f(x) = +\infty$$



Target 2.C: Add, subtract, and multiply polynomials and explain why solutions are equivalent

5. Find $(f - g)(x)$ for the following functions $f(x) = 12x + 17$, $g(x) = -11x^2 + 8x + 25$.

6. Find $(f \cdot g)(x)$ for the following functions $f(x) = 3x^2 - 7x - 5$, $g(x) = 10x - 4$.

Target 2.D: Create polynomial functions given factors and zeros.

7. Write a polynomial function, in factored form, with the given zeros $x = -6, -4, 6$

8. Write a polynomial function, in factored form, with the given zeros $x = -5, -i, i, 10$

Target 2.E: Apply the Remainder Theorem to determine the factors and zeros of a polynomial function

9. Given the factor $(x + 1)$, find the remaining factor(s) of the polynomial $2x^3 + 7x^2 - 7x - 12$

10. A friend of yours multiplies $(x + 3)$ by a quadratic polynomial and gets $x^3 - 4x^2 - 11x + 30$ as the product. Determine the unknown quadratic polynomial.

Target 2.F: Solve polynomials algebraically and graphically by using technology

11. Graph the polynomial $x^3 - 2x^2 - 5x + 6 = 0$ in your calculator and determine its solutions.

{_____, _____, _____}

12. Using algebra, find the solutions of the polynomial equation $3x^3 + 6x^2 = 24x$

Target 2.G: Analyze a polynomial function in multiple representations (equation, table, or graph) within a context and make conclusions on the features

13. The following table of values represents a cubic polynomial function. Within which interval does a relative minima occur?

- A. $[-3, -1]$
- B. $[-2, 0]$
- C. $[-1, 1]$
- D. $[0, 2]$
- E. $[1, 3]$

x	$f(x)$
-3	5
-2	2
-1	4
0	6
1	2
2	-14
3	-48

14. Answer the following questions regarding the function $f(x) = x^4 - x^3 - 7x^2 + x + 6$.

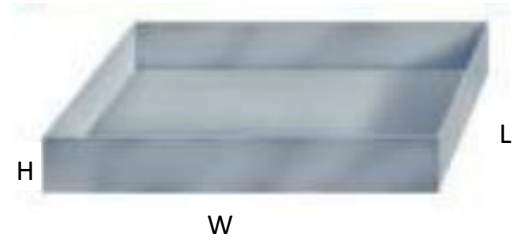
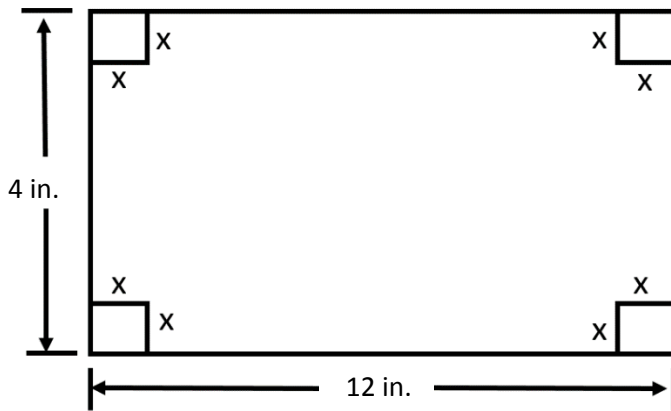
a. Describe the end behavior using limit notation.

$$\lim_{x \rightarrow -\infty} f(x) = \qquad \lim_{x \rightarrow +\infty} f(x) =$$

b. State the range in interval notation.

c. Is the function increasing or decreasing in the interval of the domain of $(-1.5, 0)$.

15. A metalworker wants to make an open box from a sheet of metal, by cutting equal squares from each corner as shown.



a. Write expressions that will represent the length, width, and height of the open box.

$L =$ _____ $W =$ _____ $H =$ _____

b. Use your expressions from part (a) to write a function in factored form for the volume of the box.

$f(x) =$ _____

c. Draw a sketch of the graph of the function.

d. Find the maximum volume of the box and the side length of the cut out squares that generate this volume. Round answers to the nearest hundredth.