

Process Standards:

Students will be able to:

- Interpret results in ways that are meaningful for the given context.
- Effectively communicate their mathematical knowledge.
- Exhibit characteristics of a cooperative learner.
- Organize class materials so that they are easily accessible and able to be used as an additional resource in problem solving situations.

Content Standards:

Students will be able to:

- Select and apply appropriate computational strategies to problem solving and life situations.
- Use technology to assist in data collection and interpretation of functions.
- Perform operations and transformations on functions, polynomials, and other mathematical entities.
- Interpret and describe classes of functions through rules, tables and graphs.
- Solve problems that involve quantities.
- Find intercepts, local extreme values, and asymptotic behavior of functions.
- Interpret intercepts, local extreme values, and asymptotic behavior of functions in given contexts.
- Select and produce appropriate graphical representations.

The purpose of the following activity is to get you to use algebraic reasoning with respect to the zero product property in order to relate an expression defining a function to its graph and x-intercepts. Please make sure you go through each step carefully!! Each group will be presenting their results to the class.

1. a. Using your graphing calculator, graph the function $f(x) = (x + 2)(x - 3)$ and estimate its x-intercepts.
b. Substitute the x-values you found in part a into the function to see if they really give a result of zero. If they do not, think about how those values can be adjusted in order to get the exact x-intercepts.
2. Repeat steps a and b from Question 1 for the function $g(x) = (x - 5)(x + 7)$.

3. Repeat steps a and b from Question 1 for the function $k(x) = (x + 9)(2x - 7)$.
4. Analyze your results from Questions 1 through 3.
 - a. Create a method for identifying the intercepts without using your calculator but from the expressions that define the functions.
 - b. Now, use the zero product property to explain the method your method.
5. Use your method from Question 4a to find the x-intercepts of the graphs of each of these functions without graphing. Then check your work by substitution and finally using your graphing calculator.
 - a. $F(x) = (x - 4)(x + 1)$
 - b. $G(x) = (2x - 5)(x + 12)$
 - c. $H(x) = x(x + 4)(8 - 3x)$
6. What's the main idea of factored intercepts?
7. Do you think every polynomial can be factored?
8. How many x-intercepts does a quadratic function have?
9. How can you use factoring to explain why a quadratic function can't have more than two x-intercepts?
10. Is it possible to have other x-intercepts that you just don't see in the graphing calculator window?
11. With respect to the unit problem, what do you think is the purpose of this activity?