

Unit 5 Project

1. A projectile is fired upward from the ground with an initial velocity of 300 feet per second. Neglecting air resistance, the height of the projectile at any time t can be described by the polynomial function $P(t) = -16t^2 + 300t$
 - a. Find the height of the projectile when $t = 1$ second.
 - b. Find the height of the projectile when $t = 5$ seconds.
 - c. How long will it be until the object hits the ground?
2. A board has length $(3x^4 + 6x^2 - 18)$ meters and width of $2x + 1$ meters. The board is cut into three pieces of the same length.
 - a. Find the length of each piece.
 - b. Find the area of each piece.
 - c. Find the area of the board before it is cut.
 - d. How is the area of each piece of the board related to the area of the board before it is cut?
3. A cubic equation has zeros at -2, 1, and 3.
 - a. Write an equation for a polynomial function that meets the given conditions.
 - b. Draw the graph of a polynomial function that meets the given conditions.
4. Alice was having a conversation with her friend Trina, who had a discovery to share:

Pick any two integers. Look at the sum of their squares, the difference of their squares, and twice the product of the two integers you chose. Those three numbers are the sides of a right triangle.

- a. Write an equation that models this conjecture using the variables x and y .
- b. Investigate this conjecture for at least three pairs of integers. Does her trick appear to work in all cases, or only in some cases? Explain.
- c. Use Trina's trick to find an example of a right triangle in which all of the sides have integer length, all three sides are longer than 100 units, and the three side lengths do not have common factors.

BONUS: If Trina's conjecture is true, use the equation found in part a to prove the conjecture. If it is not true, modify it so it is a true statement, and prove the new statement.