**Product Equations**

1. Write down at least five number pairs to solve the equation vw = 50. (Keep in mind that v and w do not have to be whole numbers and don’t even have to be positive.)
2. Write down at least five number pairs to solve the equation vw = 100.
3. Write down at least five number pairs to solve the equation vw = 0.
4. Discuss your results. How does Q#3 compare to the first two examples? Why is it so different?
5. Write down at least five number pairs to solve the equation (r - 2)(s + 1) = 100.
6. Write down at least five number pairs to solve the equation (r - 2)(s + 1) = 0.

**Factored Intercepts**

One of your tasks in the Fireworks problem is to figure out how long it will take for the rocket to land. Here are some other ways to ask the same question.

* How long does it take until the rocket returns to ground level?
* What are the roots of the function h(t) = 160 + 92t - 16t 2?
* What are the t-intercepts of the graph of the function h(t) = 160 + 92t - 16t 2?
* What are the solutions to the equation 160 + 92t - 16t 2 = 0?

The equation 160 + 92t - 16t 2 = 0 is an example of a quadratic equation.

In *Product Equations*, you saw that the only way for a product to be zero is for at least one of the factors to be zero. In this activity, you will look at how this fact about products can be used to solve quadratic equations.

1. a. Graph the function f(x) = (x + 2)(x - 3) on a graphing calculator 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 might be adjusted to get the exact x-intercepts. (Remember that your x-values were just estimates from the graph.)

1. Go through steps a and b from Question 1 for the function g(x) = (x - 5)(x + 7).
2. Go through steps a and b from Question 1 for the function k(x) = (x + 9)(2x - 7).
3. Examine your results from Questions 1 through 3.
   1. Find a method for identifying the intercepts without graphing, directly from the expressions that define the functions.
   2. Use the zero property to explain your method.
4. 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.
   1. F(x) = (x - 4)(x + 1)
   2. G(x) = (2x - 5)(x + 12)
   3. H(x) = x(x + 4)(8 - 3x)