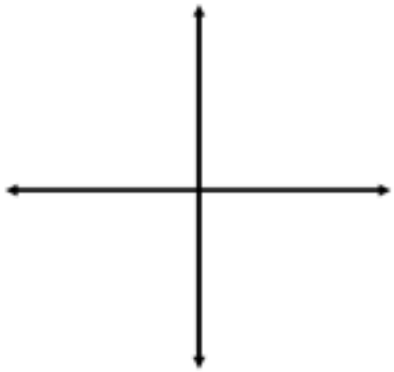
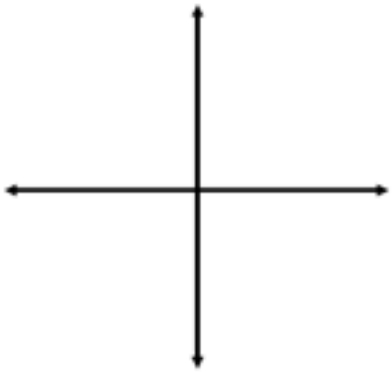
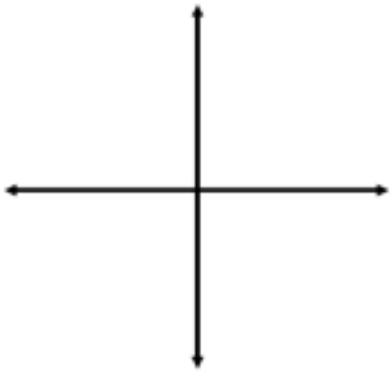
Linear-Quadratic Systems

In how many ways can a line intersect a parabola?

How can we determine whether a line and a parabola meet once, twice or never without actually solving?

How can we determine the point(s) of intersection of a line and a parabola?

Example

The height *h(t)* of a baseball, in meters, at time t seconds after it is tossed out of a window is modelled by the function $h(t) = -5t^2 + 20t + 15$. A boy shoots at the baseball with a paintball gun. The trajectory of the paintball is given by the function $g(t) = 3t + 3$.

a. When will the paintball hit the baseball?
b. What will be the height of the baseball at the time of collision?
c. Determine the domain and range of $g(t)$ and $h(t)$.

TIPS

1. Determine the value(s) of k that such that **g(x) = 6x + k** intersects **f(x) = 4x^2 - 2x - 5** at only one point.
2. Determine the value(s) of k that such that **g(x) = -2x + k** does not intersect **f(x) = -3x^2 + 4x + 1.**