Examples:

1. A point $P$ is sliding on the parabola with equation $y = x^2$. Its $x$-coordinate is increasing at a constant rate of 2 feet per minute. Find the rate of change of the following quantities at the moment that $P$ is at $(3, 9)$:

   (a) the distance from $P$ to the origin,
   (b) the area of the rectangle whose lower left corner is the origin and whose upper right corner is $P$,
   (c) the slope of the tangent to the parabola at $P$,
   (d) the angle $\angle OPQ$ where $Q$ is the point $(0, 3)$ and $O$ is the origin $(0, 0)$.

Group Work Questions

1. A video camera is positioned 4000 ft from the base of a rocket launching pad. A rocket rises vertically and its speed is 600 ft/s when it has risen 3000 feet.

   (a) How fast is the distance from the video camera to the rocket changing at that moment.
   (b) How fast is the camera’s angle of elevation changing at that same moment?

2. Two people on bikes are separated by 350 meters. Person $A$ starts riding north at a rate of 5 m/s and 7 minutes later Person $B$ starts riding south at 3 m/s. At what rate is the distance separating the two people changing 25 minutes after Person $A$ starts riding?