

Problem statement An object is moving along the parabola $y = 3x^2$.

- a) When it passes through the point $(2, 12)$, its “horizontal” velocity is $\frac{dx}{dt} = 3$. What is its “vertical” velocity at that instant?
- b) If it travels in such a way that $\frac{dx}{dt} = 3$ for all t , then what happens to $\frac{dy}{dt}$ as $t \rightarrow +\infty$?
- c) If, however, it travels in such a way that $\frac{dy}{dt}$ remains constant, then what happens to $\frac{dx}{dt}$ as $t \rightarrow +\infty$?