

The background features a light gray gradient with several realistic water droplets of various sizes scattered across the frame. A faint, circular, textured pattern is visible in the upper center, resembling a lens flare or a watermark.

LESSON 2.7

APPLICATIONS OF THE DERIVATIVE

PROBLEM

In a fireworks display, a shell is launched vertically upward from the ground, reaching a height (in feet) of $s = -16t^2 + 256t$ after t sec. The shell is designed to burst when it reaches maximum altitude.

- (a) When will the shell burst?
- (b) What is the altitude of the shell the instant it explodes?

PROBLEM

A machine is causing a particle to move along the x -axis so that its position at time t is given by $x(t) = (t - 4)^2$, where t is in seconds.

- (a) What is the particle's velocity at $t = 2$? Interpret.
- (b) The machine stops suddenly at $t = 3$, releasing the particle. As the particle continues, where will it be 5 seconds after the machine stops? Explain your thinking.