

Name _____

- You have 20 minutes
- No calculators
- Show sufficient work

1. (3 points) For $t \geq 0$, the position in meters of a particle is given by

$$s(t) = \frac{t^3}{3} - t^2 + 2t + 9$$

where t is measured in seconds.

What is the particle's acceleration at the moment when the particle's velocity is 10 m/s ?
Use correct units in your final answer.

2. (3 points) A street light is mounted on top of a 20 *ft* tall pole. A woman 5 *ft* tall walks directly toward the pole with a speed of 7.5 *ft/s*. How quickly is the length of her shadow decreasing when she is 13 *ft* from the pole?

3. (4 points) A bacteria culture grows with a constant relative growth rate. The initial bacteria count of 100 increases to 150 after 2 hours.

(a) Find an expression for the number of bacteria after t hours.

(b) At what time will the bacteria count reach 800 ?