

A particle moves along a line so that its position at any time $t \geq 0$ is given by the function $s(t) = t^3 - 9t^2 - 48t$ where s is measured in meters and t is measured in seconds.

1. What is the velocity at $t = 4$?
2. When is the particle at rest?
3. What is the particle's average velocity during the first three seconds?
4. Determine the total distance traveled during the first 5 seconds.
5. When is the particle moving forward? When is it moving backward?
6. When is the particle speeding up? When is it slowing down?
7. What is the particle's acceleration at $t = 4$?
8. At what time is the particle's velocity 10 m/sec?
9. What is the speed of the particle at $t = 2$?
10. What is the particle's velocity when its position is zero?