

1. Find the instantaneous rate of change of the volume  $V$  of a cube with respect to a side  $s$ .

2. A particle moves along a line so that its position at any time  $t \geq 0$  is given by the function:

$$s(t) = t^2 - 3t + 2, \text{ where } s \text{ is measured in meters and } t \text{ is measured in seconds.}$$

(a) Find the displacement during the first 5 seconds.

(b) Find the average velocity during the first 5 seconds.

(c) Find the instantaneous velocity when  $t = 4$ .

(d) Find the acceleration of the particle when  $t = 4$ .

(e) At what values of  $t$  does the particle change direction?

(f) Where is the particle when  $s$  is a minimum?

3. A body's velocity at time  $t$  sec is  $v(t) = 2t^3 - 9t^2 + 12t - 5$  m/sec. Find the body's speed each time the acceleration is zero.

4. The graphs show the position  $s(t)$ , the velocity  $v(t) = \frac{ds}{dt}$ , and the acceleration  $a(t) = \frac{d^2s}{dt^2}$  of a body moving along a coordinate line. Which graph is which? Give reasons for your answers.

