

NAME

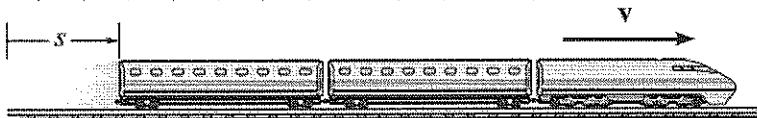
DATE

## SOLUTIONS

## PROBLEM: AP-1

## GIVEN:

When a train is traveling along a straight track at 2 m/s, it begins to accelerate at  $a = (60 v^{-4})$  m/s<sup>2</sup>, where  $v$  is in m/s. Determine its velocity  $v$  and the position 3 s after the acceleration.



## REQUIRED:

$$v_{t=3} = ?$$

$$s_{t=3} = ?$$

## SOLUTION:

$$a = \frac{dv}{dt} = 60 v^{-4}$$

$$\int_2^v \frac{1}{60 v^{-4}} dt = \int_0^3 dt$$

$$\frac{1}{300} (v^5 - 2^5) = 3$$

$$v = 3.93 \text{ m/s}$$

$$a ds = v dv = \frac{60}{v^4} ds$$

$$\frac{v^5}{60} dv = ds$$

$$\int_2^{3.93} \frac{v^5}{60} dv = \int_0^s ds$$

$$\frac{v^6}{360} \Big|_2^{3.93} = s$$

$$s = 9.98 \text{ m}$$

$$v = 3.93 \text{ m/s}$$

$$s = 9.98 \text{ m}$$