

CAR $t=0$, $x = \dot{x} = \ddot{x} = 0$ AT REST
 moves in straight line with $a = (3s^{1/3})^{m/s^2}$
 ? $t=4s$, determine accel.

where $a = f(\text{position})$ NOT TIME!

RECALL: $a = \frac{dv}{dt}$ and $v = \frac{ds}{dt}$

where $dt = \frac{ds}{v}$

$$\therefore a = \frac{v dv}{ds} \quad \therefore \int a ds = \int v dv$$

$$\therefore \int_0^s (3s^{1/3}) ds = \int_0^v v dv$$

$$\left. \frac{3s^{-\frac{1}{3} + \frac{2}{3}}}{-\frac{1}{3} + \frac{2}{3}} \right|_0^s = \frac{9}{2} s^{2/3} = \frac{v^2}{2}$$

$$\therefore v = \sqrt{\quad} = 3s^{1/3}$$

$$\boxed{v = 3s^{1/3}}$$

Then $v = \frac{ds}{dt} = 3s^{1/3}$

SEP. VARIABLES
+ INTEGRATE

$$\int \frac{ds}{3s^{1/3}} = \frac{1}{3} \int s^{-1/3} ds = \int dt$$

$$\frac{1}{3} \frac{s^{2/3}}{2/3} = t = \frac{1}{2} s^{2/3}$$

$$(2t)^{3/2} = s$$

$$\boxed{s = (2t)^{3/2}}$$

When $t=4s$, $s = 8^{3/2} = 22.627 \text{ m.}$

and $a = 3(8^{3/2})^{-1/3} = 3(8)^{-1/2} = \boxed{1.06 \frac{m}{s^2}}$

BECAUSE $a = \text{function of } s$

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