ENGR-2060

E.M. - DYNAMICS

NAME

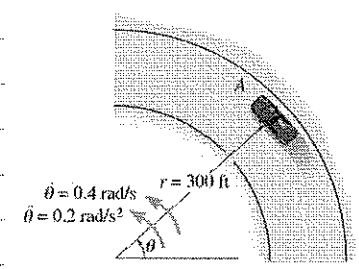
DATE

SOLUTIONS

PROBLEM: AP-11

GIVEN:

A car is traveling along the circular curve of radius $r = 300$ ft. At the instant shown, its angular rate of rotation is $\dot{\theta} = 0.4$ rad/s, which is increasing at the rate of $\ddot{\theta} = 0.2$ rad/s^2. Determine the magnitudes of the car's velocity and acceleration at this instant.



REQUIRED:

12-1

12-4

SOLUTION:

$\dot{\theta} = 0.4$ rad/s $\quad \ddot{\theta} = 0.2$ rad/s^2 $\quad r = 300$ ft $\quad \dot{r} = 0 \quad \ddot{r} = 0$

$v_r = \dot{r} = 0 \qquad a_r = \ddot{r} - r\dot{\theta}^2 = -48$ ft/s^2

$v_\theta = r\dot{\theta} = 120$ ft/s $\qquad a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta} = 60$ ft/s^2

$v = \sqrt{\Sigma^2} = 120$ ft/s

$a = \sqrt{\Sigma^2} = 76.8$ ft/s^2

$v = 120$ ft/s
$a = 76.8$ ft/s^2