Name

Date

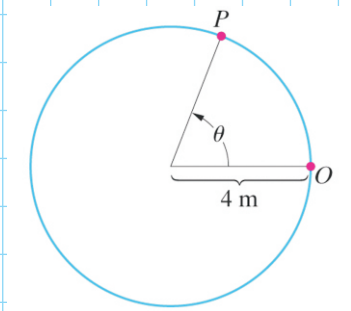
Week: _____ **Problem:** _____

Given:

The angle $\theta = 2t^2$ rad.

(a) What are the velocity and acceleration of point P in terms of normal and tangential components at $t = 1$ s?

(b) What distance along the circular path does point P move from $t = 0$ to $t = 1$ s?



Required:

Solution:

Solution:

$\theta = 2t^2$

$\frac{d\theta}{dt} = 4t = \omega$

$\frac{d^2\theta}{dt^2} = 4\frac{\text{rad}}{s^2} = \alpha$

$s = r\theta = 4\theta = 8t^2$

$v_t = 16t$ m/s

$v = r\omega = 4(4t) = 16t$

$a_t = \frac{dv}{dt} = 16$ m/s^2

(a) $\underline{\mathbf{v} = 16(1)\mathbf{e}_t \text{ m/s} = 16\, e_t \text{ (m/s)}}$

$\mathbf{a} = R\alpha\mathbf{e}_t + R\omega^2\mathbf{e}_N$

$\mathbf{a} = (4)(4)\mathbf{e}_t + (4)(4^2)\mathbf{e}_N \text{ (m/s}^2\text{)}$

$\underline{\mathbf{a} = 16\mathbf{e}_t + 64\mathbf{e}_N \text{ (m/s}^2\text{)}}$

(b) $s = R\theta = 8t^2$

$= 8(1)^2 = 8$ m