

Cartesian Motion

Engineering Mechanics: Dynamics

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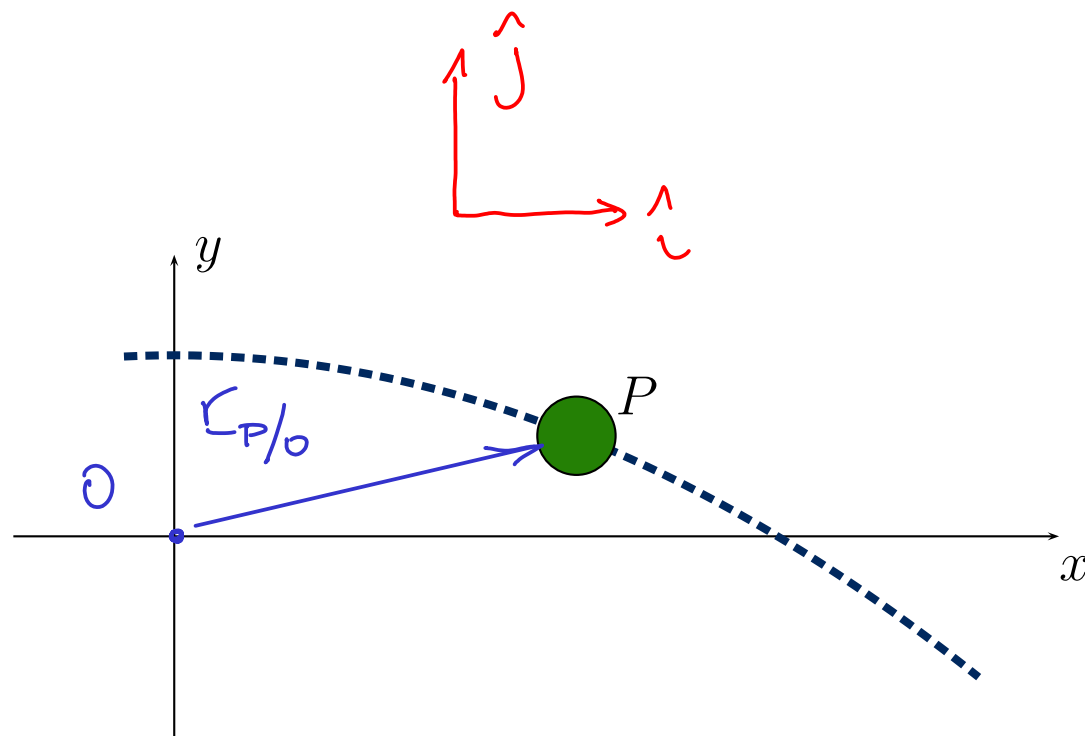
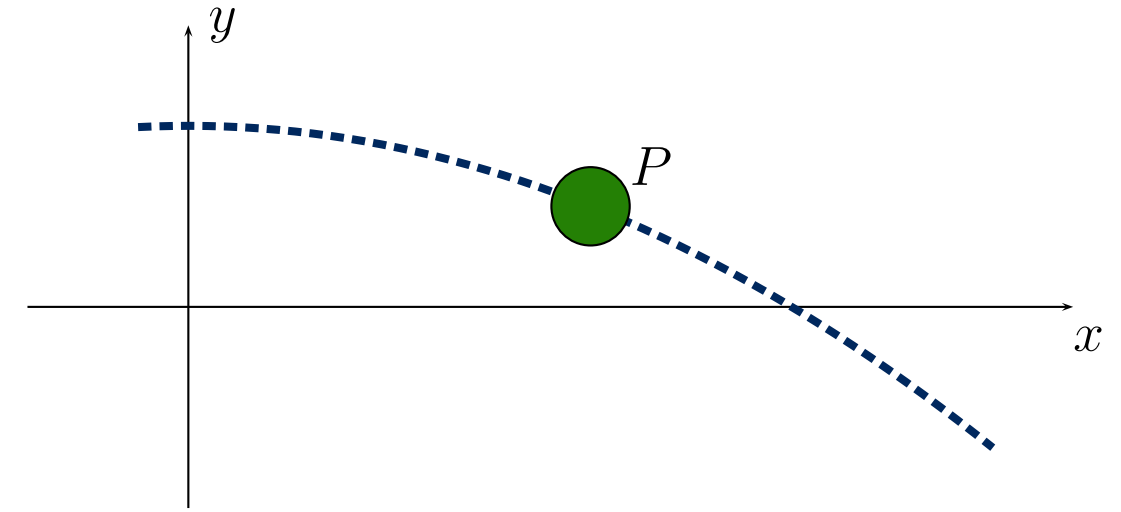
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A particle moves along a parabolic path $y(x) = a - cx^2$, with $x(t) = vt$. Find the velocity and acceleration of the particle.



POSITION

$$\begin{aligned} \underline{r}_{P/O}(t) &= x(t)\hat{i} + y(t)\hat{j} = x(t)\hat{i} + (a - cx^2(t))\hat{j} \\ &= (vt)\hat{i} + (a - c(vt)^2)\hat{j} \end{aligned}$$

VELOCITY

$$\underline{v}_P(t) = (v)\hat{i} + (-2c(vt)v)\hat{j} = (v)\hat{i} + (-2cv^2t)\hat{j}$$

ACCELERATION

$$\underline{a}_P(t) = 0\hat{i} + (-2cv^2)\hat{j}$$