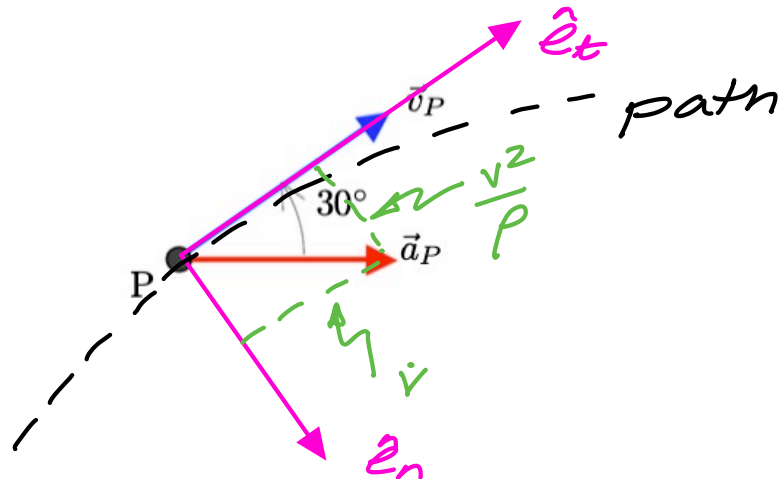


Problem Q1

Point P represents a passenger traveling in a automobile. The velocity and acceleration of P, \vec{v}_P and \vec{a}_P , respectively, are shown below at a given instant in time. Circle the item below that most accurately describes the motion of P:

- (a) The speed of P is decreasing and P is turning left.
- (b) The speed of P is increasing and P is turning left.
- (c) The speed of P is decreasing and P is turning right.
- (d) The speed of P is increasing and P is turning right.
- (e) There is insufficient information given for answering this question.

**Problem Q2**

Consider the path description for the motion of a point P. Circle the item below that most accurately describes the acceleration of P, \vec{a}_P :

- (a) The rate of change of speed for P, \dot{v}_P , is ALWAYS the same as the magnitude of its acceleration, $|\vec{a}_P|$.
- (b) The rate of change of speed for P, \dot{v}_P , is the same as the magnitude of its acceleration, $|\vec{a}_P|$ only if the path of P is STRAIGHT.
- (c) The acceleration of point P is always PERPENDICULAR to the path of P.
- (d) None of the above.

$$\vec{a} = \dot{v} \hat{e}_t + \frac{v^2}{\rho} \hat{e}_n \Rightarrow |\vec{a}|^2 = \dot{v}^2 + \left(\frac{v^2}{\rho}\right)^2$$

$$\therefore |\vec{a}|^2 = \dot{v}^2 \text{ if } \begin{cases} v=0 \\ \text{or } \rho = \infty \text{ (straight path)} \end{cases}$$