

1 Acceleration in Polar Coordinates

The acceleration vector written in polar coordinates is:

$$\vec{a} = [\ddot{s} - s\dot{\phi}^2]\hat{s} + [2\dot{s}\dot{\phi} + s\ddot{\phi}]\hat{\phi}$$

Below are motion diagrams, where each dot represents the location of a particle at equal time intervals.

For each motion diagram, indicate the direction of the acceleration vector at the middle dot (point 3) by sketching velocity vectors for points 2&4 and subtracting them.

Break the acceleration vector into polar components and match the components to terms in the acceleration equation above.

