Y68-8644-00-9

June 9, 2020

Mark Jensen

The original question was “For a motion on a curved path with constant acceleration (magnitude of displacement / distance covered) is? (Bhandari 2020).

Let’s extend Robert’s (Toop 2020) answer to two dimensions.

We have a particle moving East at . At , we apply a constant acceleration toward the North of .

Since the acceleration is perpendicular to the initial velocity the velocity toward the East will be constant, i.e.,



Now pull out the suvat equations (Sparks 2018) to calculate the velocity and displacement in the North direction.



We know that the initial value of the velocity toward the North is , and .



Let’s look at the trajectory of the particle.

Particle Movement Over Time

The x, y coordinates of a particle with constant velocity along the x axis and with constant acceleration along the y axis. For example, at t=5 s, the x position is 50 m and the y position is 25 m.

The x, y coordinates of a particle with constant velocity along the x axis and with constant acceleration along the y axis. For example, at *t=5 s*, the x position is *50 m* and the y position is *25 m*.

From here it is simply a matter of apply the formula from Doctor Pythagoras class in triangles to get the displacement as a function of time.

Bhandari, Tara. 2020. “For a Motion on a Curved Path with Constant Acceleration (Magnitude of Displacement / Distance Covered) Is?” Question & Answer. *Quora* (blog). June 9, 2020. https://www.quora.com/For-a-motion-on-a-curved-path-with-constant-acceleration-magnitude-of-displacement-distance-covered-is.

Sparks, Ben. 2018. *Calculating a Car Crash*. Numberphile. Bath, UK: Numberphile. https://youtu.be/i3D7XYQExt0.

Toop, Robert. 2020. “Robert Toop’s Answer to For a Motion on a Curved Path with Constant Acceleration (Magnitude of Displacement / Distance Covered) Is? - Quora.” Question & Answer. *Quora* (blog). June 9, 2020. https://www.quora.com/For-a-motion-on-a-curved-path-with-constant-acceleration-magnitude-of-displacement-distance-covered-is/answer/Robert-Toop-2.