Spiraling

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The particle motion is expressed in polar coordinates:

$$\vec{r}(t) = (r(t), \Theta(t)) = (t, 3\ln(t))$$

for $t \in (0, \infty)$, and the units of r in kilometers, θ in radians and t in hours.

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As t increases, what happens to $r(t)$ and $\theta(t)$? Do they increase, or decrease? What, generally, does the path of the particle look like?

Both r and *theta* increase forever. The path of hte particle lookes like a spiral starting at the origin, with the windings of the spiral becoming more closely packed as the spiral moves outward.

- What is the change dr in the coordinate $r(t)$, for a small change dt in t?

  $$\frac{dr}{dt} = 1$$

  What is the change $d\theta$ in the coordinate $\theta(t)$, for a small change dt in t?

  $$\frac{d\theta}{dt} = \frac{1}{t}$$