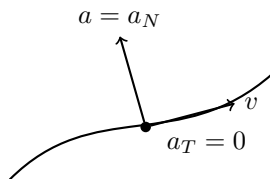


Question 5

At an instant, a particle has velocity $\vec{v} = \langle 2, 1, 2 \rangle$ and acceleration $\vec{a} = \langle 1, 2, -2 \rangle$. Find the scalar tangential and normal components a_T, a_N . State what each says about the motion.

Question 5 – Solution

Strategy Use $a_T = (\vec{v} \cdot \vec{a})/\|\vec{v}\|$ and $a_N = \sqrt{\|\vec{a}\|^2 - a_T^2}$.



Components Here $\|\vec{v}\| = 3$, $\|\vec{a}\| = 3$, and $\vec{v} \cdot \vec{a} = 0$. Thus

$$\boxed{a_T = 0}, \quad \boxed{a_N = 3}.$$

Interpretation The instantaneous speed is not changing because the tangential component is zero. The full acceleration changes the direction of motion; it is perpendicular to the velocity.