

FRQ #2 (Calculator) – Vectors, displacement vs total distance traveled, position/velocity/acceleration

AP[®] Calculus BC 2021 Free-Response Questions

2. For time $t \geq 0$, a particle moves in the xy -plane with position $(x(t), y(t))$ and velocity vector

$\langle (t - 1)e^{t^2}, \sin(t^{1.25}) \rangle$. At time $t = 0$, the position of the particle is $(-2, 5)$.

- (a) Find the speed of the particle at time $t = 1.2$. Find the acceleration vector of the particle at time $t = 1.2$.
- (b) Find the total distance traveled by the particle over the time interval $0 \leq t \leq 1.2$.
- (c) Find the coordinates of the point at which the particle is farthest to the left for $t \geq 0$. Explain why there is no point at which the particle is farthest to the right for $t \geq 0$.