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ANSWERS

QUESTION 1

$r = xi + yj + zk$

$r = (2t^3)i + (4t^3 - 7t)j + (t+3)k$

i. Velocity $= \frac{dr}{dt}$

$\Rightarrow 24t^2 i + (12t^2 - 7)j + k$

ii) acceleration $= \frac{d^2r}{dt^2}$

$\Rightarrow 48t\, i + 24t\, j + k$

2. $r = xi + yj + zk$

$r = 3ti + t^3 j + t^2 k$

$\frac{dr}{dt} = 3i + 3t^2 j + 2tk$

at $t = 1$

$\frac{dr}{dt} = 3i + 3j + 2k$

$\left|\frac{dr}{dt}\right| = \sqrt{(3)^2 + (3)^2 + (2)^2} = \sqrt{22}$

$T = \frac{\frac{dr}{dt}}{\left|\frac{dr}{dt}\right|} = \frac{3i + 3j + 2k}{\sqrt{22}}$