

14.7: Examples

? Whiteboard Problem 14.7.1: A Pair of Vector Problems

Position to Velocity:

An object's position as a function of time is given by

$$\vec{r}(t) = \frac{c}{bt+1} \hat{x} + cbt\hat{y} + at^2\hat{z}, \quad (14.7.1)$$

where a , b , and c are constants.

1. What are the SI units of a , b , and c ?
2. Find an expression of the object's *speed* as a function of time.

Velocity to Acceleration:

An object's velocity as a function of time has components

$$v_x(t) = bt^2 + c \quad (14.7.2)$$

$$v_y(t) = qt \quad (14.7.3)$$

$$v_z(t) = 0, \quad (14.7.4)$$

where $b = 10 \text{ m/s}^3$, $c = 5 \text{ m/s}$, and $q = -2.0 \text{ m/s}^2$.

1. What is the magnitude of the object's acceleration at $t = 0$?
2. What about at $t = 3.0 \text{ s}$?

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