Ch 2  Describing Motion in 1D

Q. When is an object at time, \( t \),
which started at \( x_0 \) at time, \( t_0 \),
with initial velocity, \( v_0 \),
if it moves with constant acceleration, \( a \)?

A. \[ x(t) = x_0 + v_0 (t-t_0) + \frac{1}{2} a (t-t_0)^2. \]

(This simplifies to \[ x = x_0 + v_0 t + \frac{1}{2} a t^2 \] \( \text{if } t_0 = 0 \).)

Q. What is its velocity at time \( t \)?

A. \[ v(t) = v_0 + a t. \]

(This is slope of \( x(t) \) vs. \( t \) curve at the time \( t \).)

Q. What is the acceleration at time \( t \)?

A: \[ a = \text{constant} \] is same for all \( t \).

(\( a \) is the slope of the \( v(t) \) vs. \( t \) curve,
which, being constant, guarantees that \( v(t) \) vs. \( t \) must be a straight line.)

The text should, but does NOT, present these 3 equations for kinematics under constant acceleration.