1 Dimensional Motion

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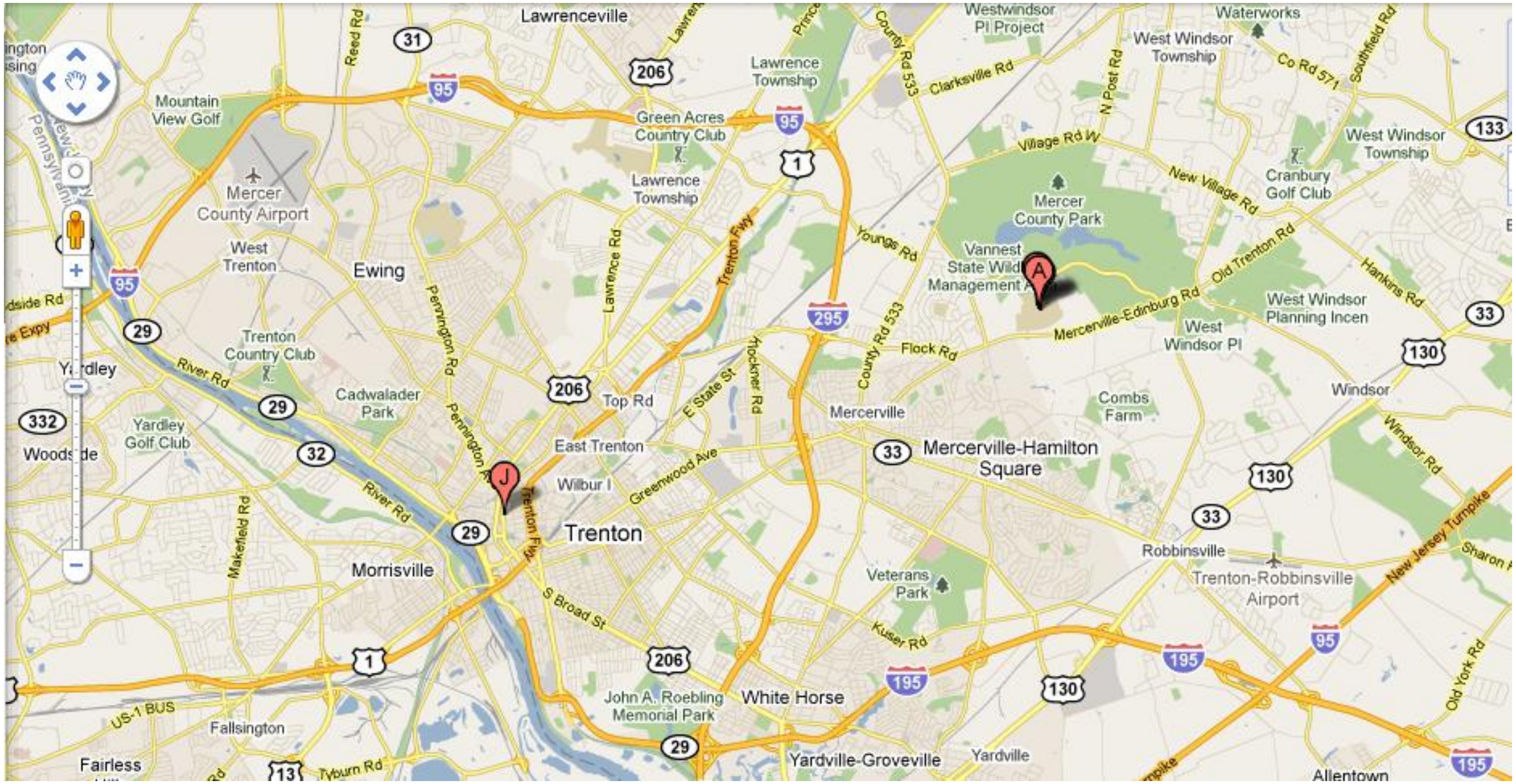
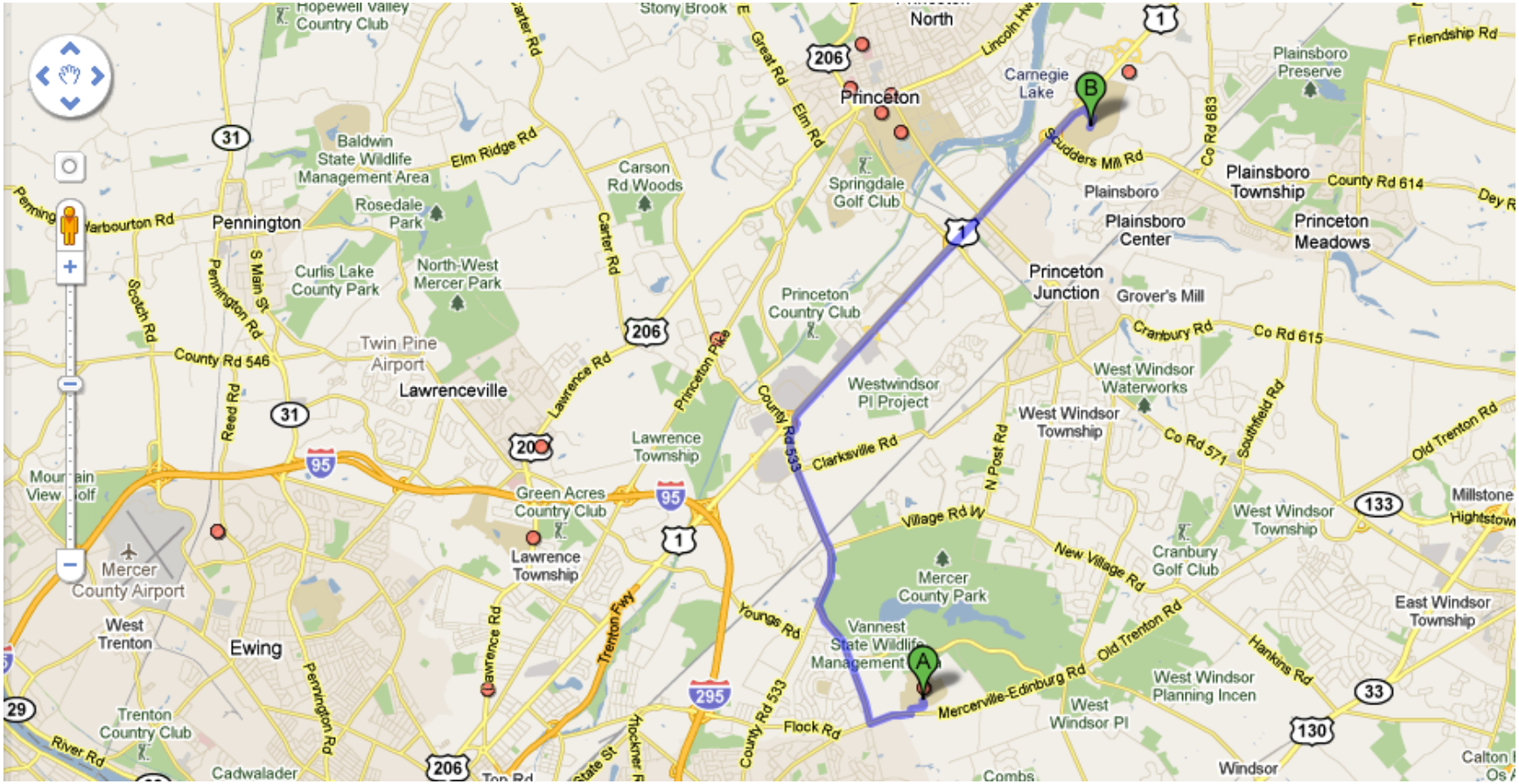
Position

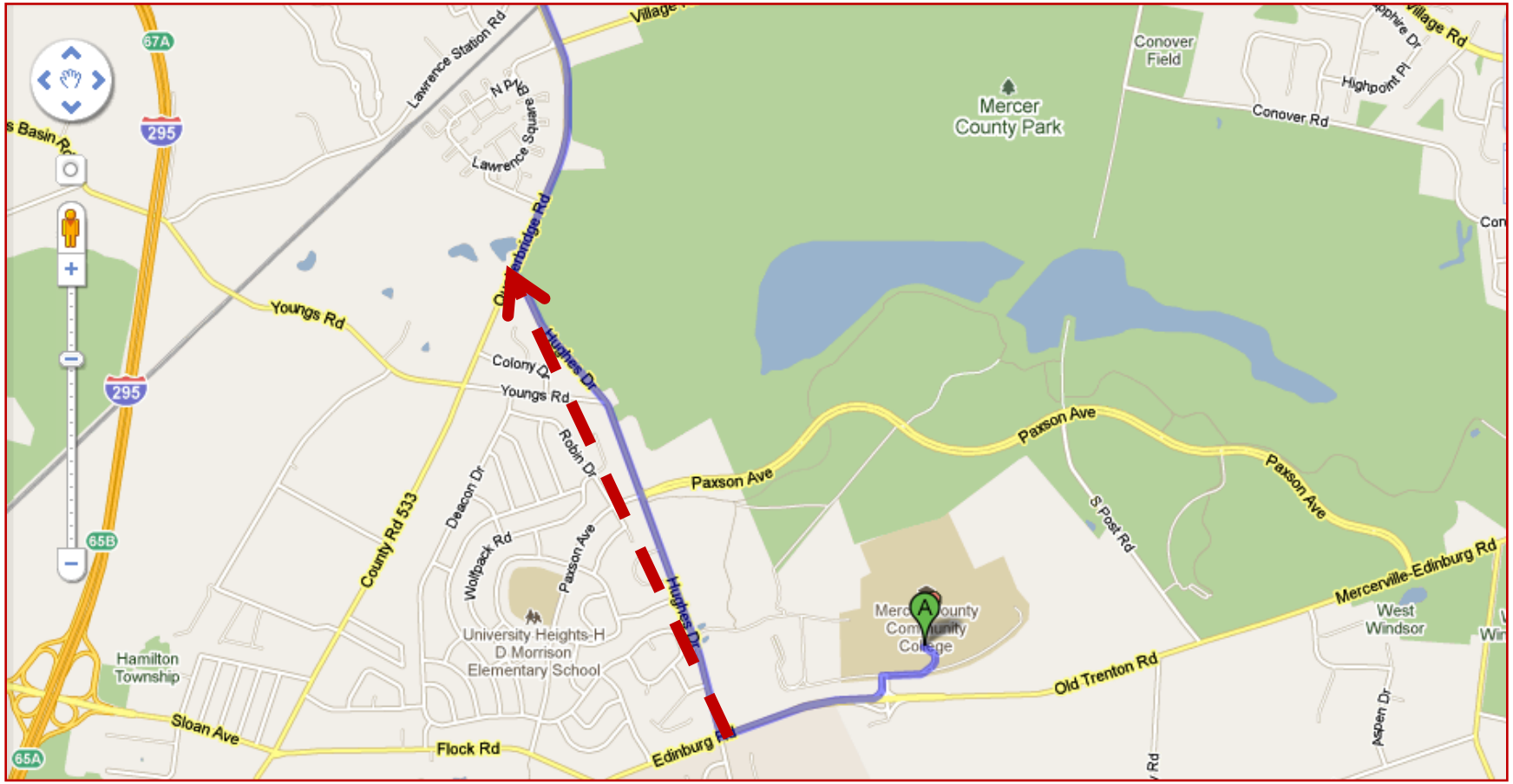


Lawrenceville
Mercer County Airport
West Trenton
Ewing
Trenton Country Club
Cadwalader Park
Yardley Golf Club
Green Acres Country Club
Lawrence Township
Mercer County Park
Vannest State Wildlife Management Area
West Windsor Township
Cranbury Golf Club
West Windsor Planning Incen
West Windsor Pl
Mercerville
Mercerville-Hamilton Square
Combs Farm
Windsor
East Trenton
Trenton
Morrisville
Robbinsville
Trenton-Robbinsville Airport
Veterans Park
John A. Roebling Memorial Park
White Horse
Yardville-Groveville
Yardville
Fallsington
Fairless
Allentown
Mountain View Golf
Waterworks
Westwindsor Pl Project

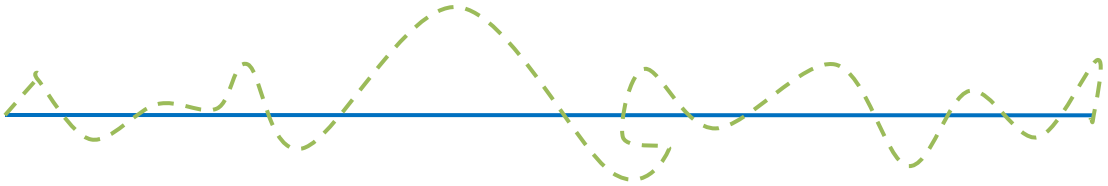
Distance – 11.3 miles



Displacement

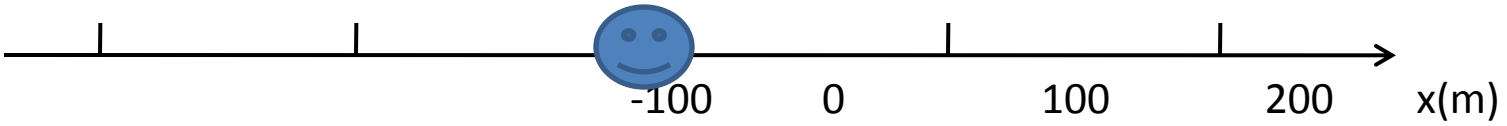


Dennis walking a dog



- Dennis walked 200 meters straight.
- What displacement and distance for both?

Motion Along a Straight Line



Position:

$$x_i = 0 \text{ m}$$

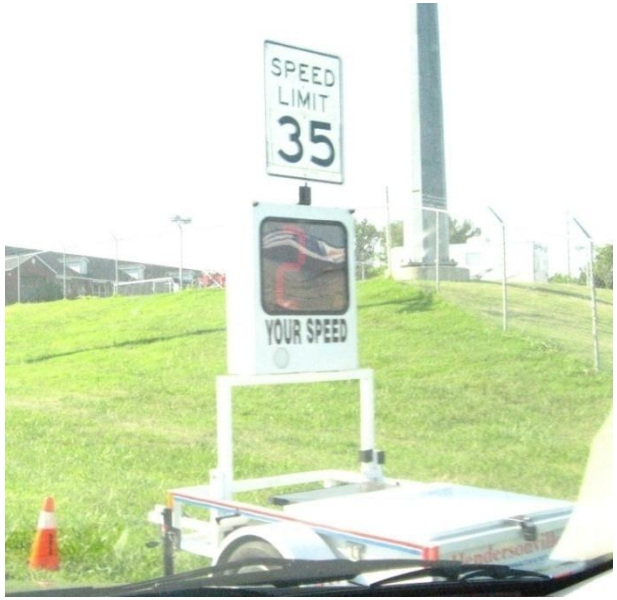
$$x_f = 200 \text{ m}$$

Displacement:

$$\Delta x = x_f - x_i = 200 \text{ m}$$

Average velocity

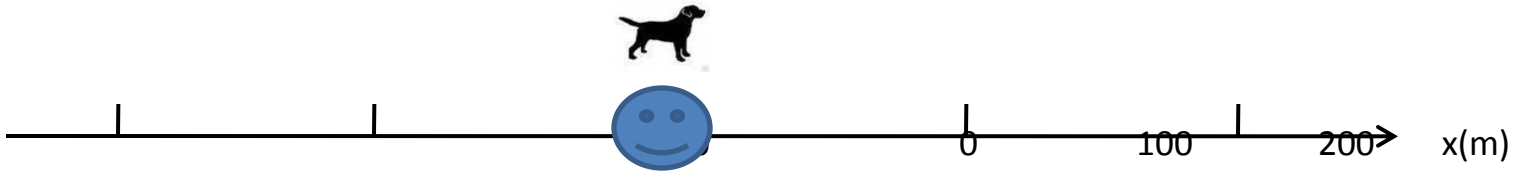
Instantaneous velocity



- Are speeding tickets given based on average velocity or instantaneous velocity?

Average Speed

Not a straight line



Position:	Dennis	Dog
	x_i = 0 m	_____
	x_f = 200 m	_____
Displacement:		
	$\Delta x = x_f - x_i$ = 200 m	_____
Distance:	_____	320 m

Motion with Constant Velocity

A driver may cruise at a constant velocity.

Average Acceleration

- A car tend to go faster and faster when driven down hill.
- A falling objects falls faster and faster along the way.

$$a_{ave} = \frac{v_f - v_i}{\Delta t}$$

$$Unit: m/s^2$$

Braking

- A car moving 11.1 m/s brakes with an average acceleration of -3 m/s^2. How long will take it to stop?

Acceleration is negative

$$a = -3\ m/s^2$$

$x(m)$

$$v_i = +11.1\ m/s; \qquad v_f = 0\ m/s;$$

$$t = ?$$

$$a_{ave} = \frac{v_f - v_i}{\Delta t}$$

$$\Delta t = \frac{v_f - v_i}{a_{ave}} = \frac{0 - 11.1\ m}{-3\ m/s} = +3.7\ s$$

1-D Motion

Basic Concepts	Definition	More Concepts
Position	x	
Displacement	$\Delta x = x_f - x_i$	distance
Average Velocity	$v_{ave} = \Delta x/\Delta t$	Instantaneous Velocity Average speed
Average Acceleration	$a_{ave} = \Delta v/\Delta t$	

Constant acceleration

- Enter the equations for the following relationship:

a, v_0, t, v_f

_____

$a, v_0, t, \Delta x$

_____

$a, v_0, v_f, \Delta x$

_____

Activity: Half Meter Free Fall

- Drop a pencil with one hand and try to catch it with the other hand half meter lower.

- Try it with a buddy.
-

- Which is harder?

Sky Dive

Skydiving in front of Mount Everest

Free fall model

- no air resistance
- no wind
- Initial velocity is zero

Question: what is the velocity at the end of 1 minute?

Free Fall

- Neglect air resistance and wind

$$g = -9.8\ m/s^2$$