

# Rates of Change

## Section 2.1

*“Speed is often confused with insight. When I start running earlier than others, I appear faster.”*

– Johan Cruyff

# Today's Questions.

- What is change?
- What is a rate of change?
- What is an *instantaneous* rate of change?

## Think - Pair - Share.

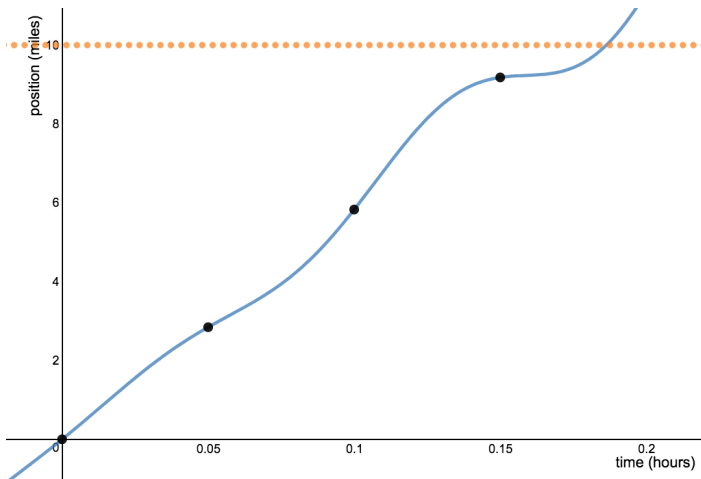
You are the Chief of Police for the local police department. Unfortunately, your department has no speed guns. Devise a plan to catch speeding cars on a ten mile stretch of highway.

The speed limit on this highway is 65 miles per hour.

# Clicker.

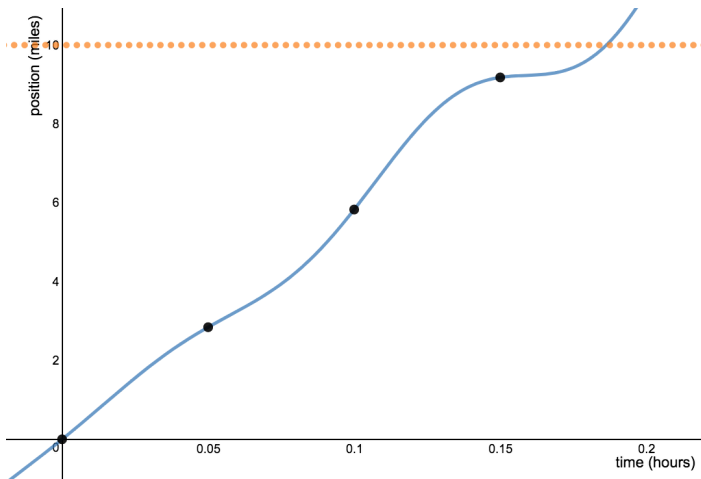
The graph below shows a car's position versus time. When is the car going fastest?

- A.  $t = 0$       B.  $t = 0.05$       C.  $t = 0.1$       D.  $t = 0.15$



# Think - Pair - Share.

Would this car get a speeding ticket under your plan? Should they get a ticket?

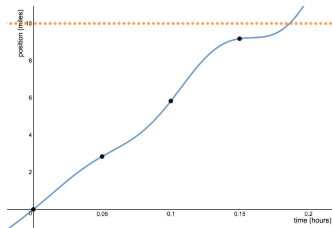


# Partners.

- 1 Below is a table of positions and times for the car in question. Compute the average speed for each of the 0.05 hour intervals.

|               |      |      |      |      |
|---------------|------|------|------|------|
| time (hr)     | 0.00 | 0.05 | 0.10 | 0.15 |
| position (mi) | 0.00 | 2.84 | 5.83 | 9.18 |

- 2 The car's average speed over 10 miles was 53.5 miles per hour. How long did it take the car to go 10 miles?
- 3 Suppose  $p = 4.94$  miles when  $t = 0.09$  hours. Use this information to approximate the car's speed when  $t = 0.10$  hours.

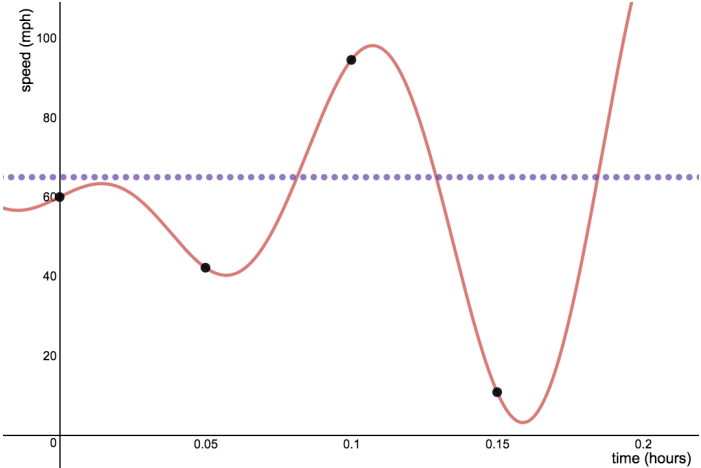


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# Brainstorm.

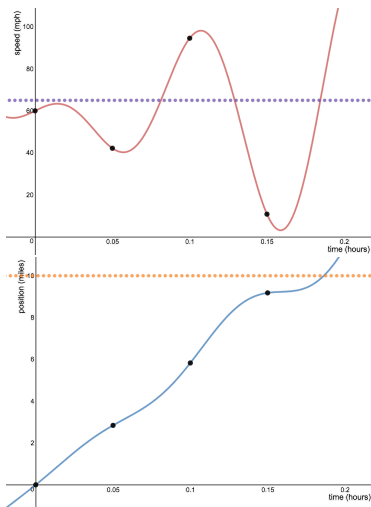
Here's a graph of the car's speed. What are the advantages and disadvantages of using speed guns to catch speeders?





# Brainstorm.

Here's a graph of the car's speed. What are the advantages and disadvantages of using speed guns to catch speeders?



## Think - Pair - Share.

You are driving on a highway and you need to turn left in exactly ten miles. Unfortunately, your car odometer isn't working and you don't have a smart phone/GPS. Devise a plan to figure out when to turn.

Does it matter if the speed limit changes at some point on the road?

# Today's Questions.

- What is change?
- What is a rate of change?
- What is an *instantaneous* rate of change?
- Why do we care?