Name: _____ **AP**

Classwork 15

1. Find $\lim_{x \to 1} \frac{2x^3 - 6x^2}{x - 3}$

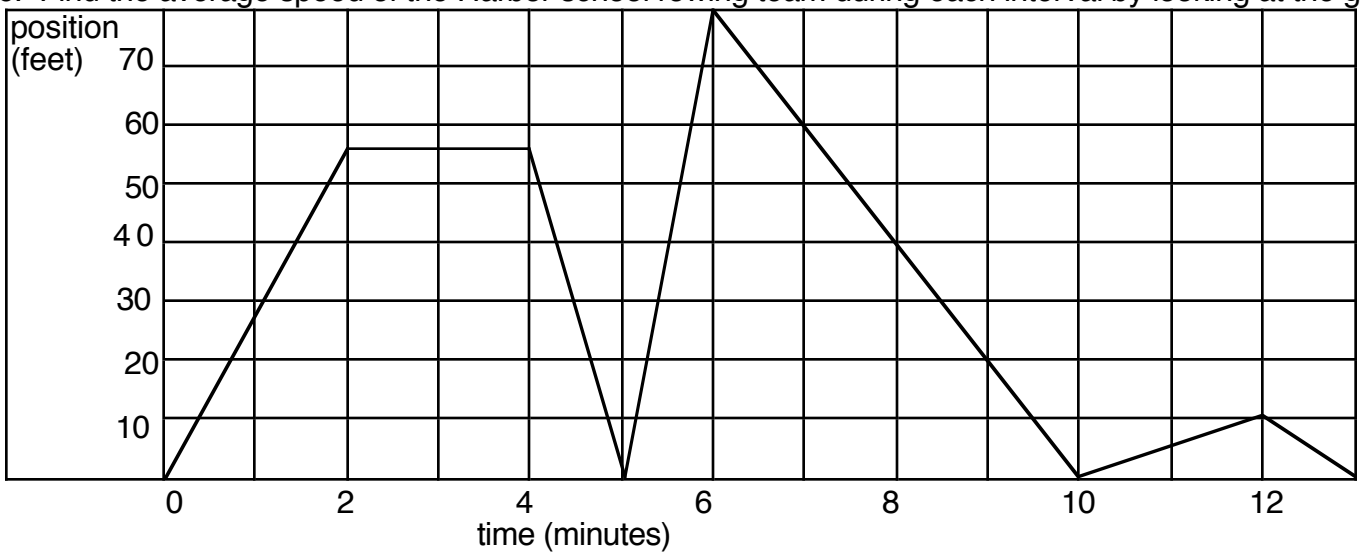
2. Find $\lim_{x \to 3} \frac{2x^3 - 6x^2}{x - 3}$

3. The mouse in 433 scampers 20 feet across the room in 4.5 seconds. Find the mouse's speed.

4. Lily gets on the B52 in hopes of speeding her ride to work. At 7:32 the bus is 1.2 miles from school. At 7:47 the bus is still .3 miles away from school. Find its speed in miles/hr.

5. What is the difference in your calculations between #3 and #4? (what is the difference in the data you are given?)

6. Find the average speed of the Harbor school rowing team during each interval by looking at the graph.



a) Between 0 and 2 minutes b) between 4 and 5 minutes c) between 6 and 10 minutes

d) When is the boat stopped?

e) When is it moving the fastest?

f) How can you tell when it is moving towards shore and when it is moving away from shore?

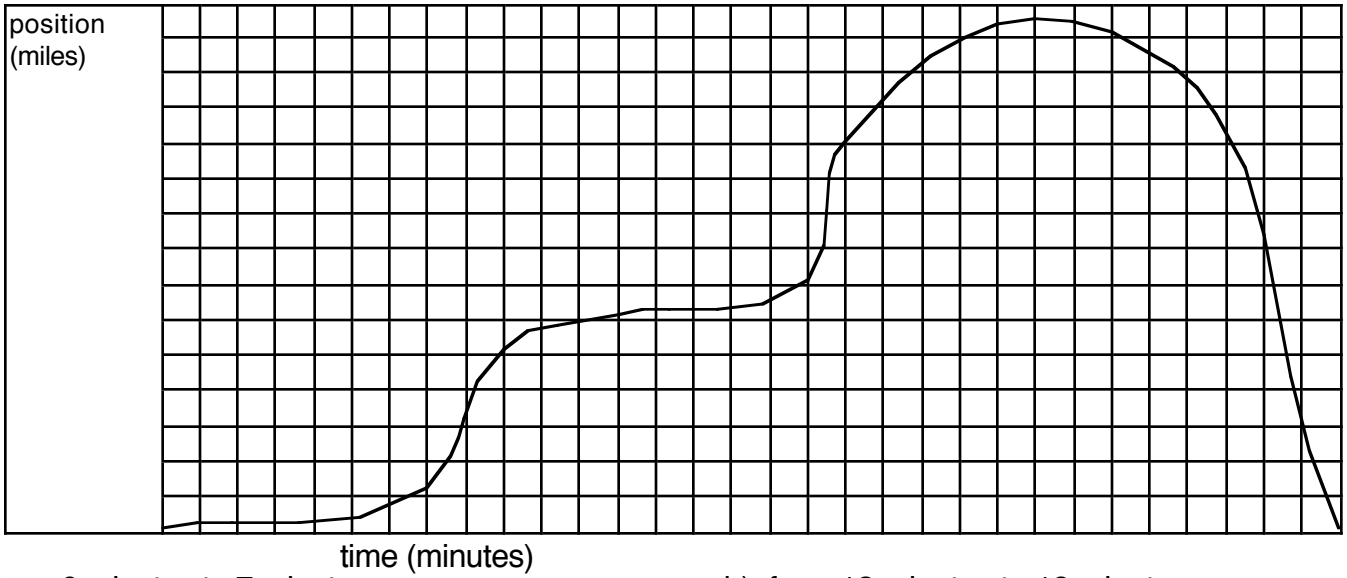
g) When is the slope of the graph 0 ?

h) When is the slope the highest?

i) When is the slope negative and when is it positive?

j) How does slope relate to speed? Why?

10. Find the speed of a bus driving through Brooklyn based on the graph.



a) from 0 minutes to 7 minutes

b) from 12 minutes to 18 minutes

c) from 16 minutes to 18 minutes

d) Draw a slope on the graph to represent each of your calculations. Why doesn't the slope match the graph exactly?

e) How fast is the car going at exactly 17 minutes into the journey? Imagine the driver looked down at the speedometer- what would she see?

f) At exactly 17 minutes, what is the change in distance? What is the change in time?

g) How does this relate to limits?

h) Write a limit expression that would give the exact speed at exactly 17 minutes.

7. Imagine that we had an equation to describe the motion of a boat in New York harbor. The equation is $d = 1/2t^3 + t^2 - 4t$. Put this graph into your calculator.

a) Why is this graph a smooth curve instead of line segments? Why is this realistic?

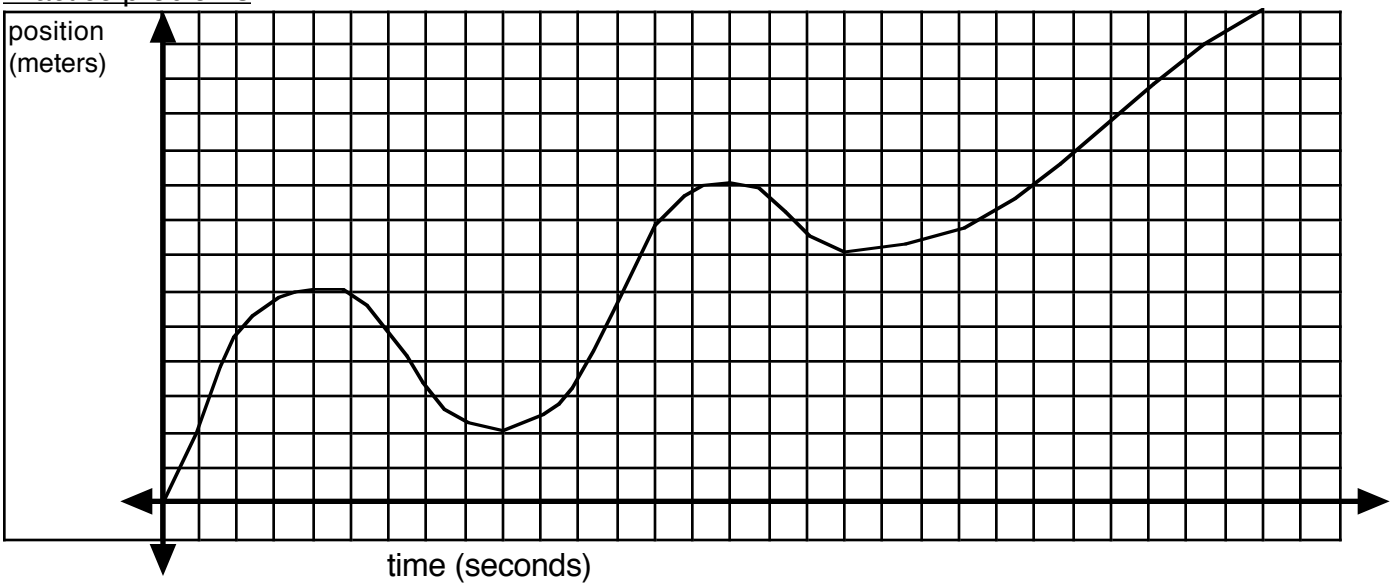
b) Let's say I wanted to find the **exact** speed at t = 2 minutes. The graph looks pretty curvy there... so write a limit expression to say what I am looking for.

c) Zoom in to your graph at x = 2 at least 10 times. What do you notice?

d) Go back to Y= and enter the graph $y = 6x - 12$ into Y2. Graph both of the functions at the same time. What do you see when you are zoomed in?

e) What do you see when you are zoomed **out**?

Practice problems



1. Calculate the average speed of the object over each interval.
   a) 2 s to 12 s b) 4 s to 10 s c) 5 s to 9 s d) 6s to 8 s

2. Find the instantaneous speed of the object at 7 seconds.

3. Draw a representation of that speed on the graph.

4. Write a limit representing the instantaneous speed.