

# MTH 201: Calculus

## Module 1A: How do we measure velocity?

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GVSU

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# Agenda for today

- ▶ Review of Daily Prep assignment, and Q+A

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- ▶ For next time: Followup activities and things to do

# Polling for today

Go to `www.mentimeter.com` and enter code `xx yy zz`

# A basic question

## Reminder

The **average velocity** of a moving object is an estimate of its velocity over an **interval** of time. The **instantaneous velocity** of a moving object is its velocity at a **single moment** in time.

## Fundamental Question

It's easy to find average velocity given two points. But how do you find instantaneous velocity, where you only have *one* point?

Activity: On your device, go to the spreadsheet set up at:

<https://bit.ly/201-1a>



## Debrief with a graph

<https://www.desmos.com/calculator/obpytdzxsf>

## Summing it up

- ▶ The **average velocity** of an object on the interval  $[a, b]$  is the **slope of the “secant line”** that goes through  $(a, s(a))$  and  $(b, s(b))$ .

## Summing it up

- ▶ The **average velocity** of an object on the interval  $[a, b]$  is the **slope of the “secant line”** that goes through  $(a, s(a))$  and  $(b, s(b))$ .
- ▶ To find the **instantaneous velocity** of the object at the *single* time value  $t = a$ : Move the second point  $b$  closer to  $a$ , measure the average velocity, and repeat – look for a single value that is being approached.

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- ▶ Alternate take: Think of the second point  $b$  as  $a + h$  where  $h$  is a small distance, and let  $h$  move toward zero.

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- ▶ It's also the slope of the “tangent line” that touches the graph of  $s(t)$  at the single point  $(a, s(a))$ . If we zoomed in on the graph of  $s$  at this point, the graph would flatten out and appear to be equal to this line.

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# Applying the concept

Back to Mentimeter for two polling questions

## NEXT TIME...

- ▶ **Followup activities:** To be done on your schedule, posted to ClassKick (watch CampusWire and Blackboard for a link). Complete by due date for 1 engagement credit.
- ▶ **Daily Prep for Part B:** Go ahead and start reading/watching video; see calendar for due date
- ▶ **Ask questions and interact:** Get on CampusWire and share thoughts, questions, and help.