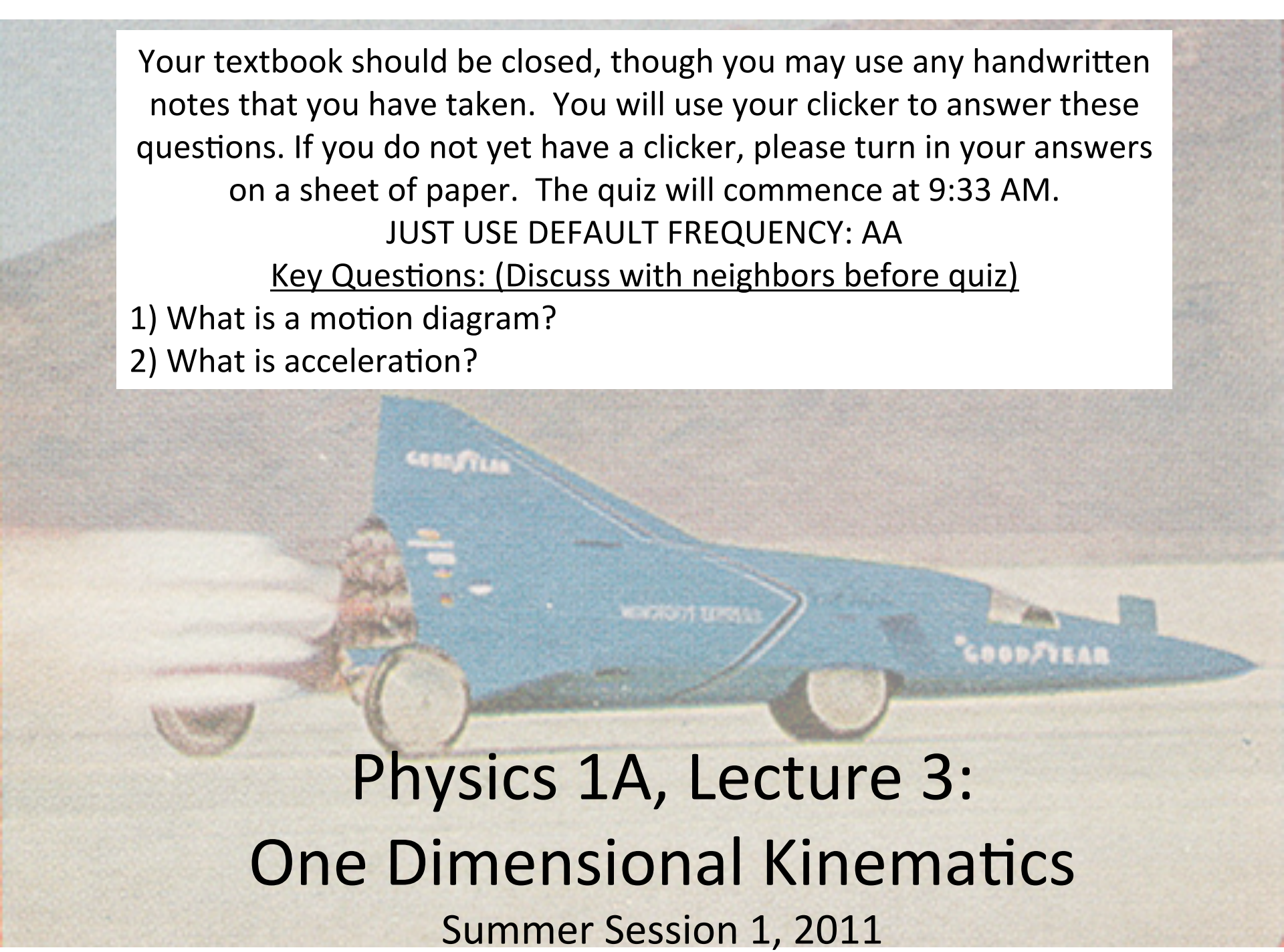
Your textbook should be closed, though you may use any handwritten notes that you have taken. You will use your clicker to answer these questions. If you do not yet have a clicker, please turn in your answers on a sheet of paper. The quiz will commence at 9:33 AM.

JUST USE DEFAULT FREQUENCY: AA

Key Questions: (Discuss with neighbors before quiz)

1) What is a motion diagram?
2) What is acceleration?



Physics 1A, Lecture 3:
One Dimensional Kinematics

Summer Session 1, 2011

Reading Quiz #1-1

- What is the one thing kept constant in between images of all motion diagrams?

A) the direction of the velocity and acceleration

B) the time interval

C) the direction of motion

D) the speed

E) nothing is kept constant

Reading Quiz #1-2

- What is acceleration?

A. The change in position divided by the change in time

B. The change in velocity divided by the change in time

C. The change in speed divided by the change in time

D. The change in direction divided by the change in time

Things to note: Homework #1

Should say:

$$mv^2 r = \mu mg$$

e. Solve for a: $y = v_0 t + \frac{1}{2}at^2$ f. Solve for g: $T = 2\pi\sqrt{\frac{L}{g}}$ g. Solve for μ :$mv^2 \overline{r=\mu mg}$

2.2 Solving systems of equations

A) $h = h_0 + v_0 t - \frac{1}{2}gt^2$, B)$v^2 = v_0^2 - 2gh$, C)$v = v_0 - gt$

1) You are given v_0, h_0, and g and the equations above. Do you have enough equations to solve for

Things to note: Homework #1

Section 2.2 Do second one first, (first one is really challenging)

→ Get desired variable on one side of an equation and only knowns on the other side.

2.2 Solving systems of equations

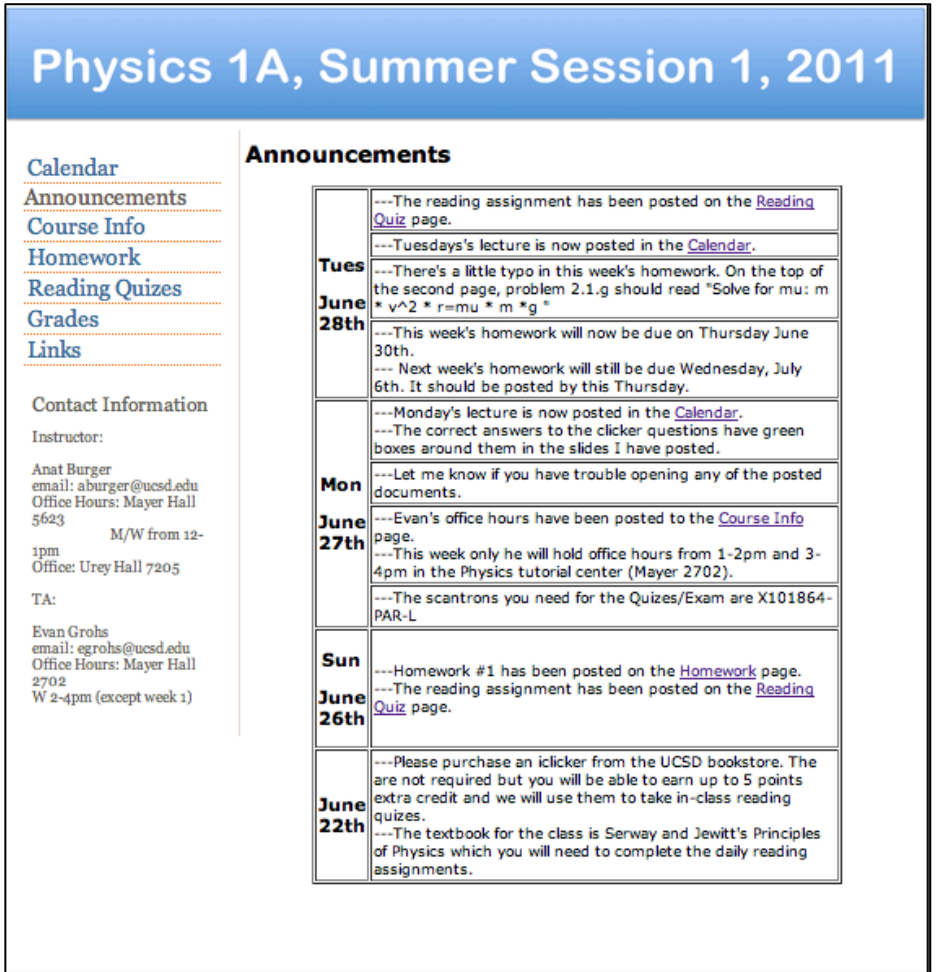
A) $h = h_0 + v_0 t - \frac{1}{2} g t^2$, B) $v^2 = v_0^2 - 2gh$, C) $v = v_0 - gt$

1) You are given v_0, h_0, and g and the equations above. Do you have enough equations to solve for v? Can you do it with two equations? With one? Solve for v:

2) You are given v, t, and g. Do you have enough equations to solve for h? Can you do it with two equations? With one? Solve for h:

Things to note:

Check the Announcement page regularly!



Physics 1A, Summer Session 1, 2011

Calendar
Announcements
Course Info
Homework
Reading Quizes
Grades
Links

Contact Information

Instructor:

Anat Burger
email: aburger@ucsd.edu
Office Hours: Mayer Hall 5623
M/W from 12-1pm
Office: Urey Hall 7205

TA:

Evan Grohs
email: egrohs@ucsd.edu
Office Hours: Mayer Hall 2702
W 2-4pm (except week 1)

Announcements

Tues June 28th	---The reading assignment has been posted on the Reading Quiz page.
	---Tuesdays's lecture is now posted in the Calendar.
	---There's a little typo in this week's homework. On the top of the second page, problem 2.1.g should read "Solve for mu: m * v^2 * r=mu * m *g "
	---This week's homework will now be due on Thursday June 30th. --- Next week's homework will still be due Wednesday, July 6th. It should be posted by this Thursday.
Mon June 27th	---Monday's lecture is now posted in the Calendar. ---The correct answers to the clicker questions have green boxes around them in the slides I have posted.
	---Let me know if you have trouble opening any of the posted documents.
	---Evan's office hours have been posted to the Course Info page. ---This week only he will hold office hours from 1-2pm and 3-4pm in the Physics tutorial center (Mayer 2702).
	---The scantrons you need for the Quizes/Exam are X101864-PAR-L
Sun June 26th	---Homework #1 has been posted on the Homework page. ---The reading assignment has been posted on the Reading Quiz page.
June 22th	---Please purchase an iclicker from the UCSD bookstore. The are not required but you will be able to earn up to 5 points extra credit and we will use them to take in-class reading quizes. ---The textbook for the class is Serway and Jewitt's Principles of Physics which you will need to complete the daily reading assignments.

Things to note:

Check out extra recommended problems posted to the Homework webpage (will not be collected, but covers testable material):

Vectors:

Easy: Ch 1, problems 38 and 41

Medium: Ch 1, problems 43, 45, 46

Velocity:

Easy: Ch2, problems 3,5

Medium: Ch2, problems 4,8,9

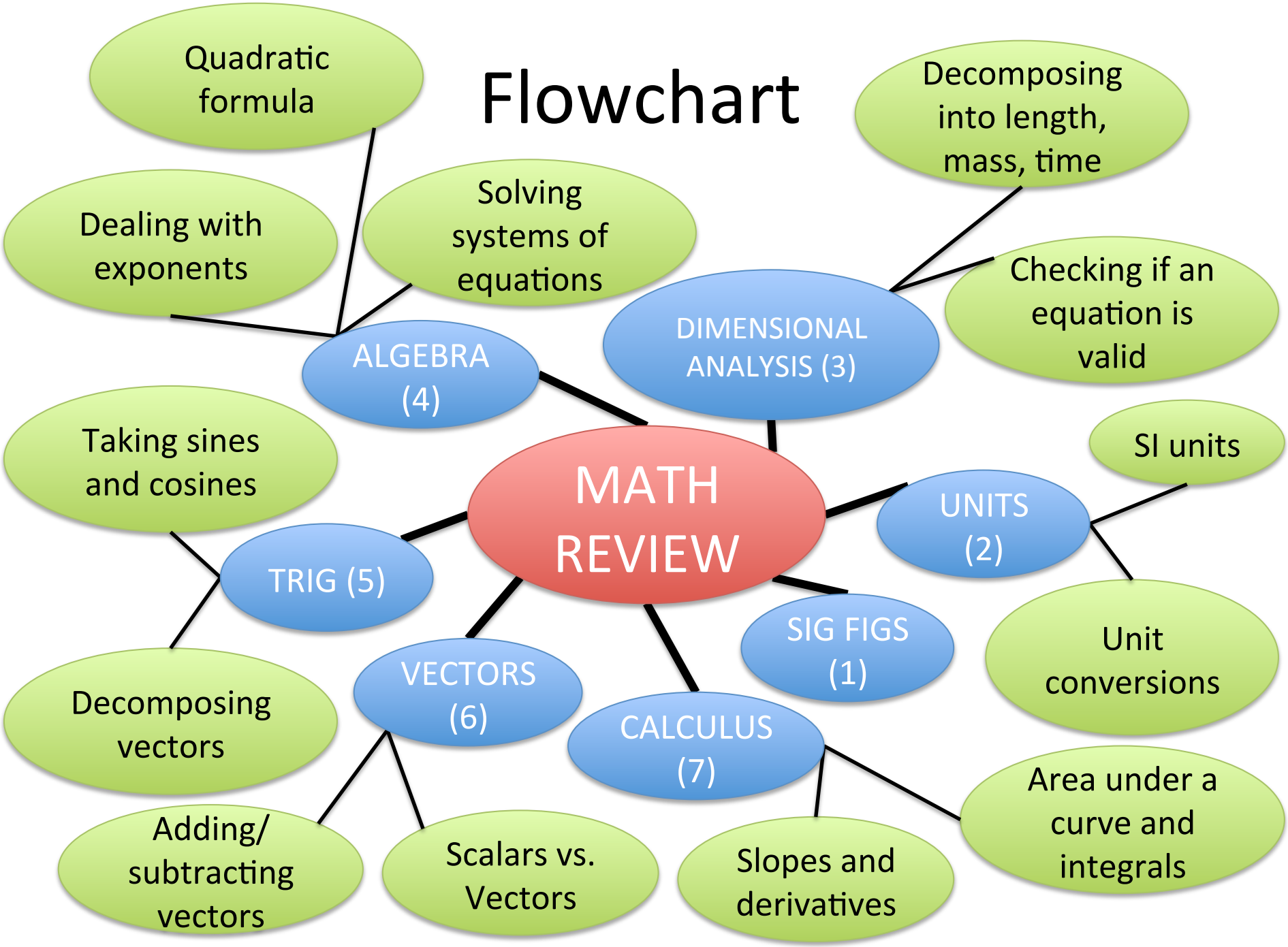
Reminders

- Homework due in class tomorrow
- Homework #2 should be ready for download tomorrow, will be due next Wednesday.
- Today's office hours:
  - Me (12-1pm in Mayer 5623)
  - Evan (1-2pm and 3-4pm)
- Tonight's problem session with Evan:
  - 5-6pm in Peterson hall 104

Quick anonymous poll

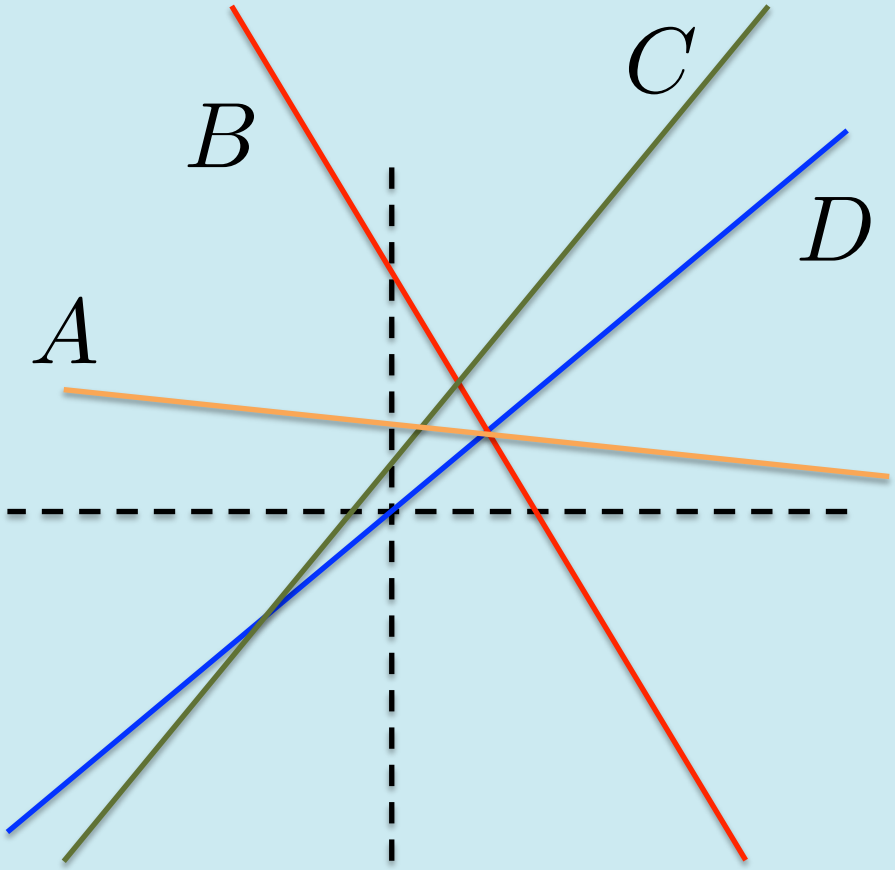
- Would you like me to podcast the lecture:

A) Yes! Please! That would help a lot!
B) I don't care. I probably wouldn't use it
C) No, I would rather you didn't use a microphone

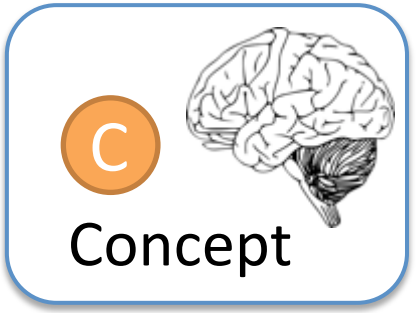

Flowchart
MATH REVIEW
ALGEBRA (4)
Quadratic formula
Dealing with exponents
Solving systems of equations
DIMENSIONAL ANALYSIS (3)
Decomposing into length, mass, time
Checking if an equation is valid
UNITS (2)
SI units
Unit conversions
SIG FIGS (1)
TRIG (5)
Taking sines and cosines
Decomposing vectors
VECTORS (6)
Adding/ subtracting vectors
Scalars vs. Vectors
CALCULUS (7)
Slopes and derivatives
Area under a curve and integrals

Clicker Question 3-1
Slope

- Which line has the largest positive slope?



Major concept



Take derivative
--or—
Find slope

Take derivative
--or—
Find slope

Displacement

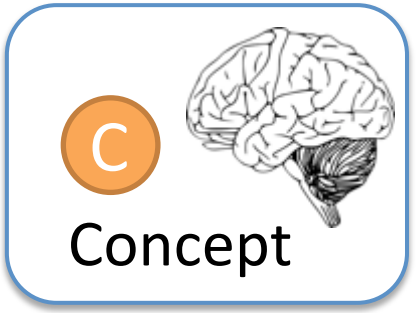
Velocity

Acceleration

Take integral
--or—
Area under curve

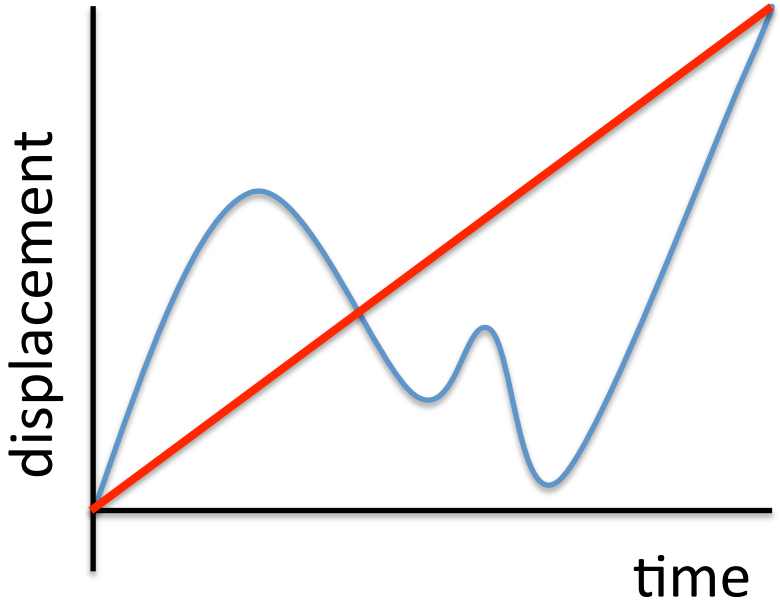
Take integral
--or—
Area under curve

Calculus Review: Slopes and Derivatives

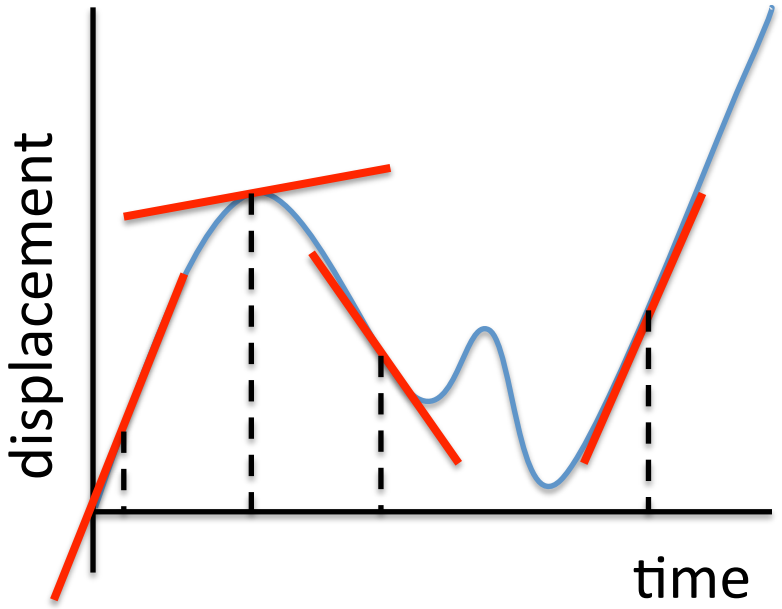


- We use derivatives in physics to describe how things are changing (usually changing over time):

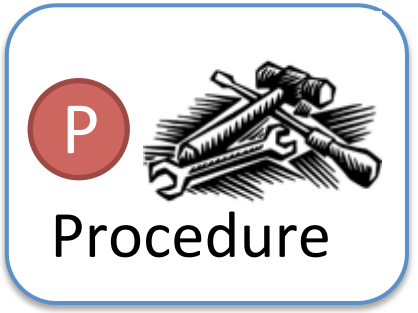
Average change



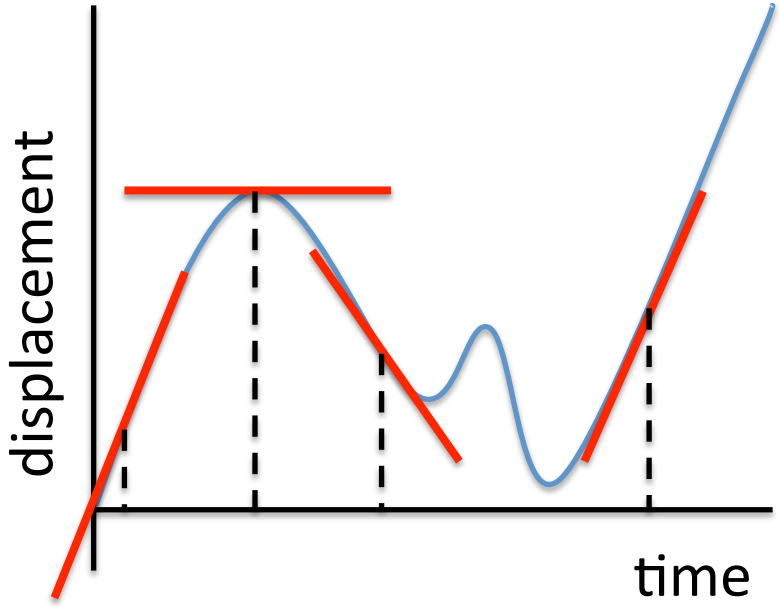
Instantaneous change

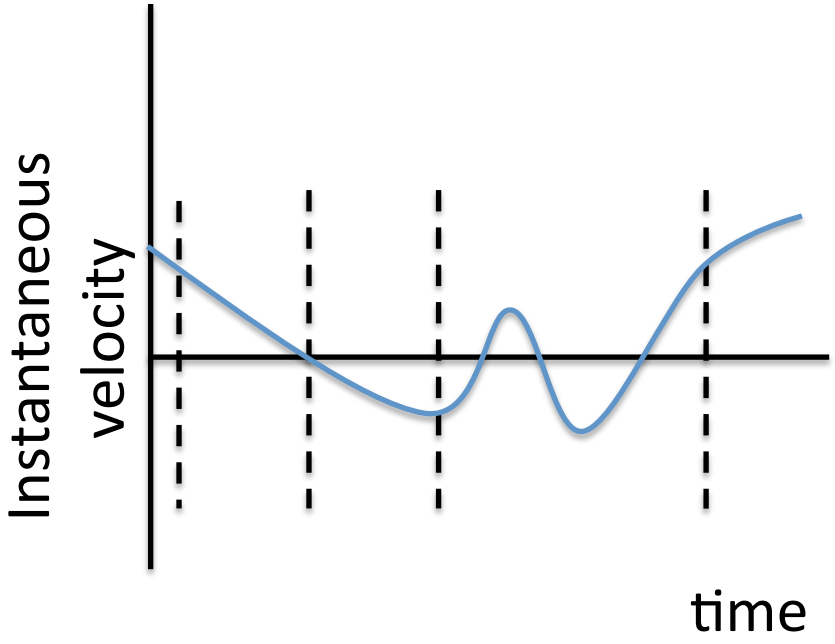


Calculus Review: Slopes and Derivatives



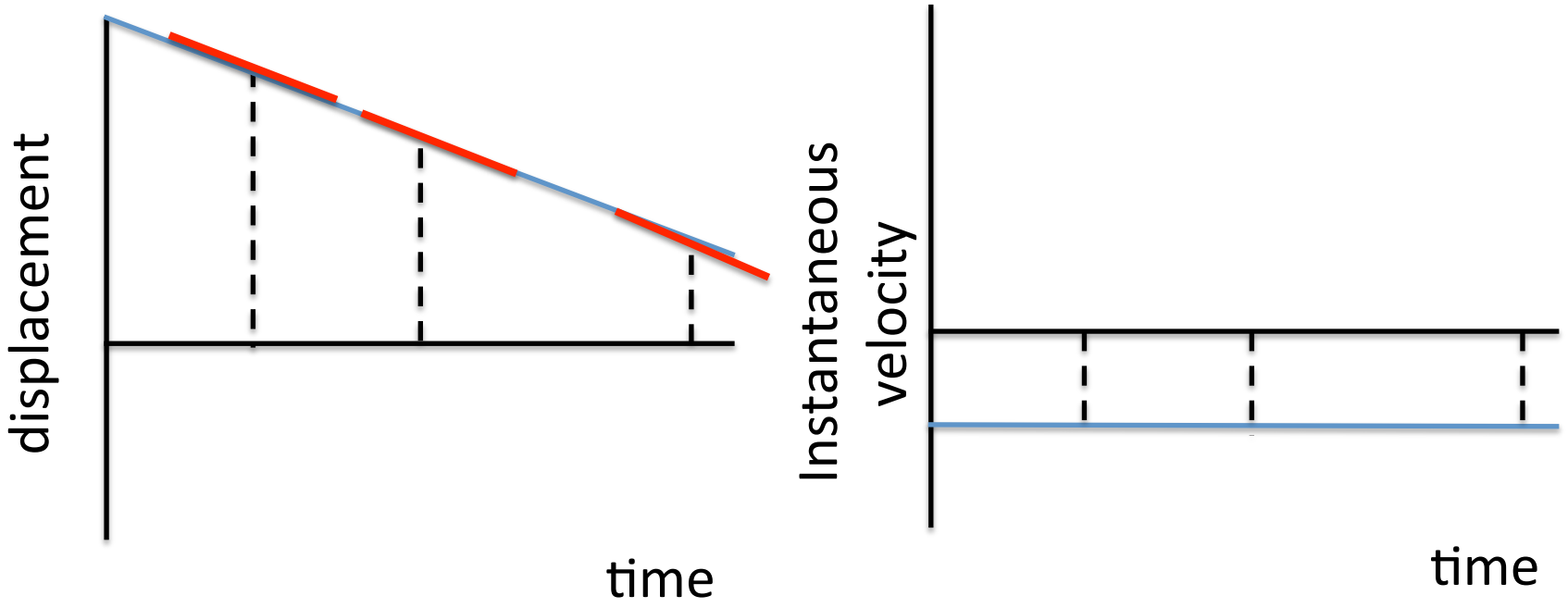
- You can plot a derivative by measuring the slope of a line tangent to a curve at each point:





Calculus Review: Derivatives

- You can plot a derivative by measuring the slope of a line tangent to a curve at each point:



Calculus Review:
Derivatives

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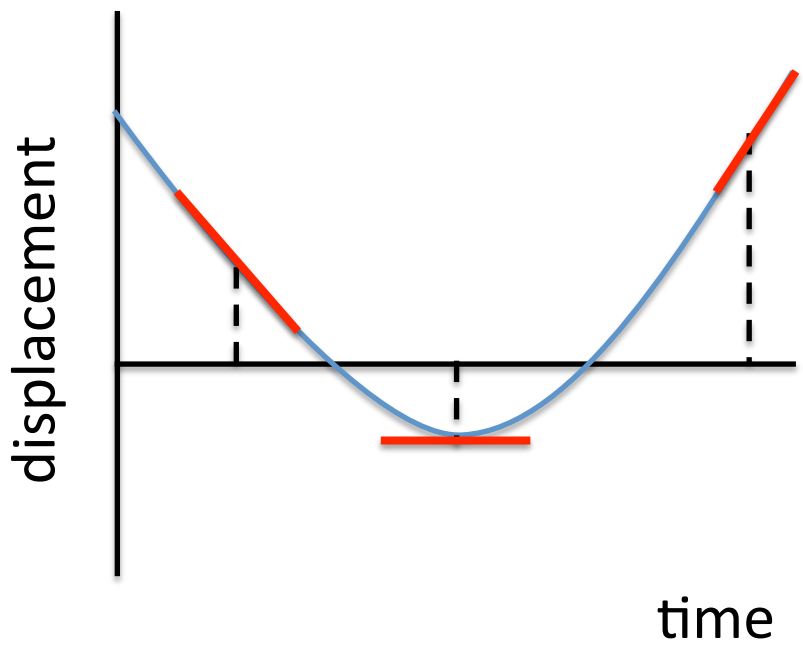
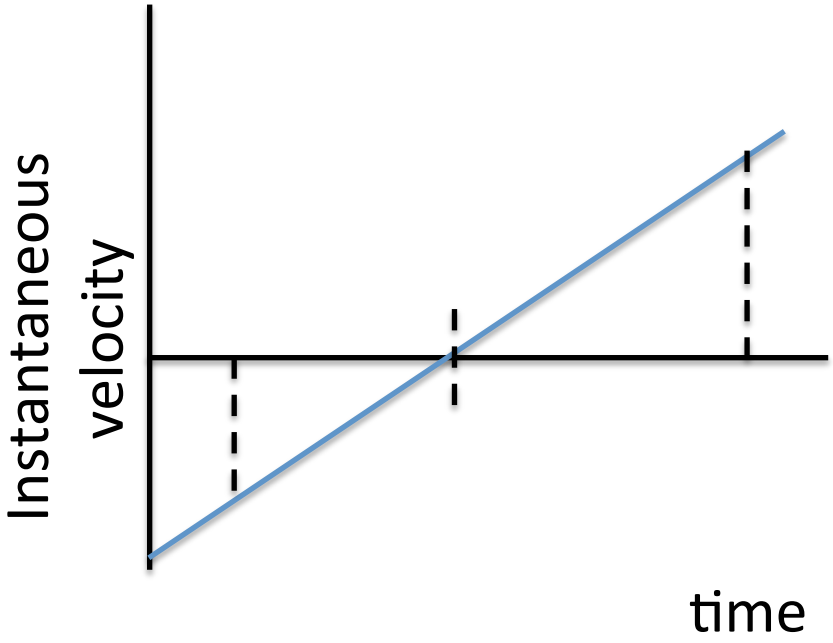
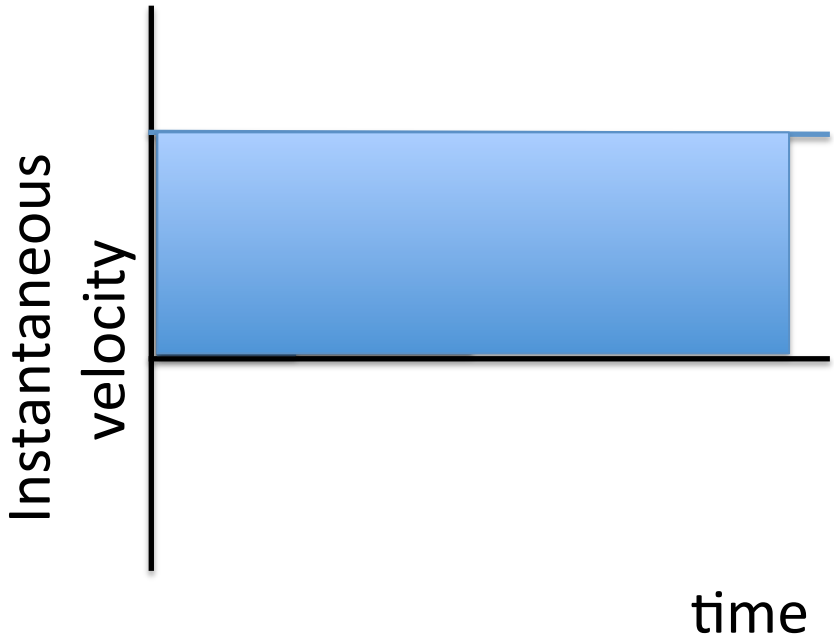


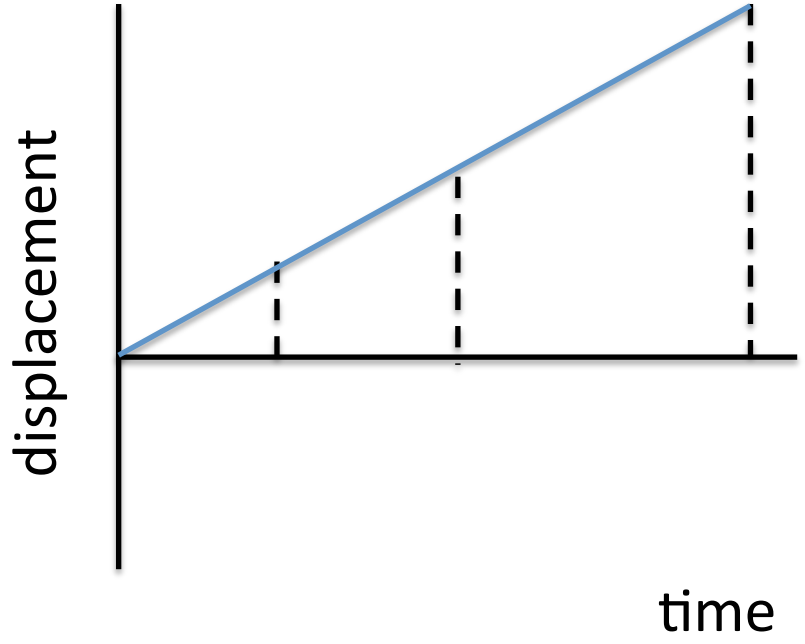


Calculus Review:

Area under a curve and Integrals

- We use integrals in physics to describe how much change has accumulated (usually over time).





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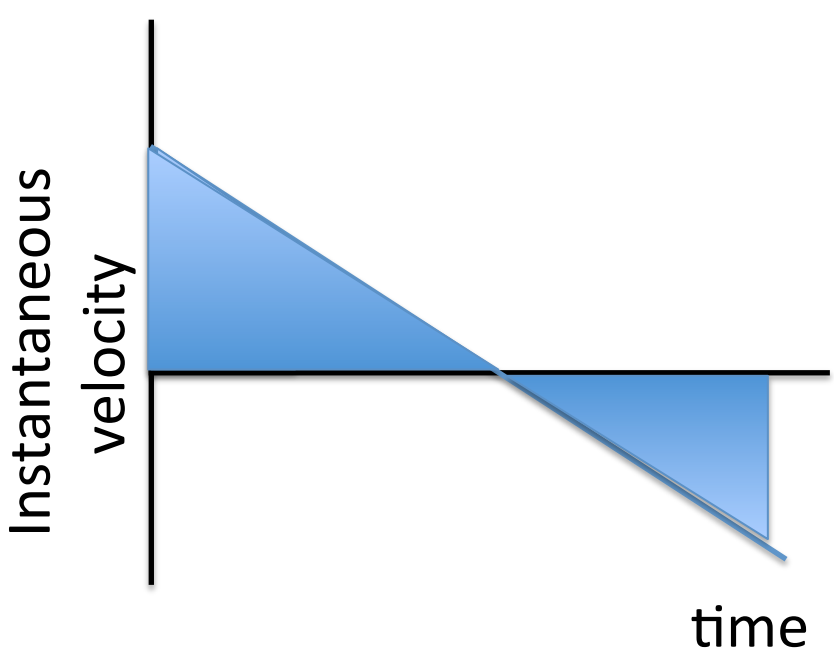
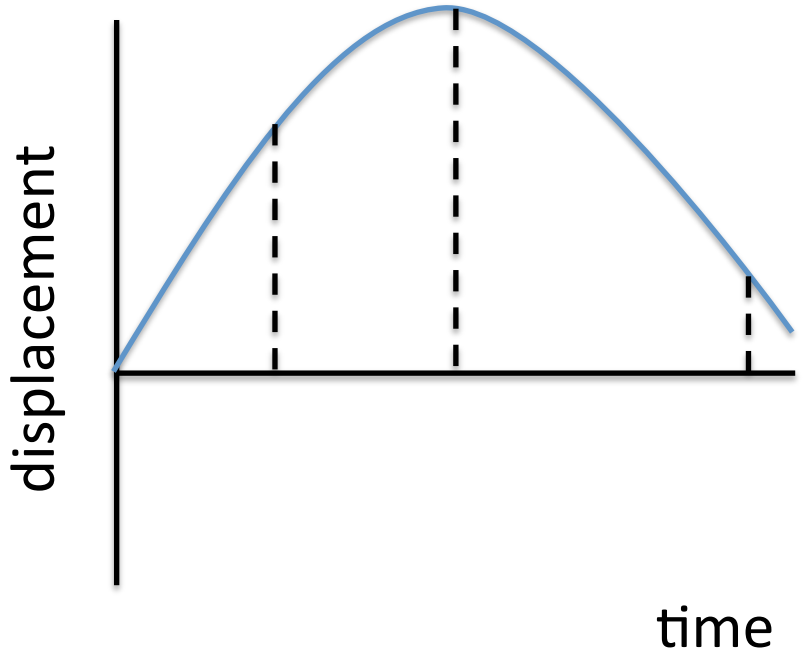
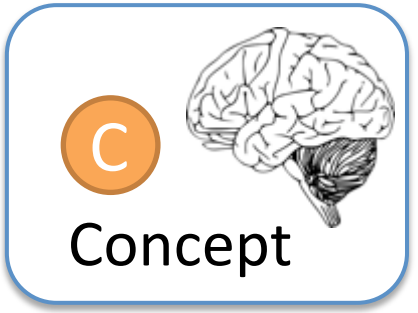
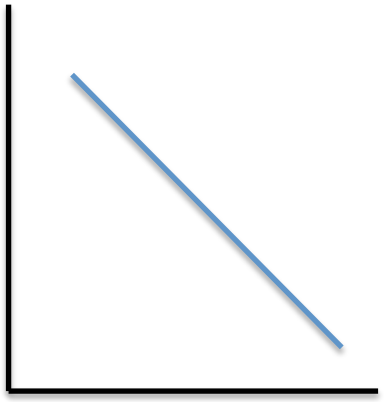


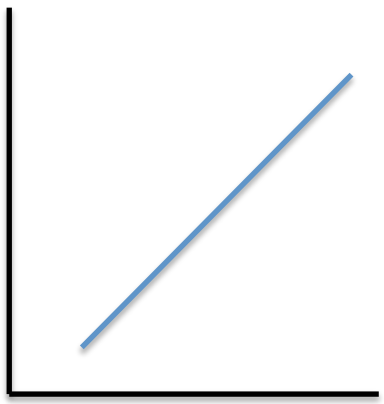


Graphical understanding of derivatives

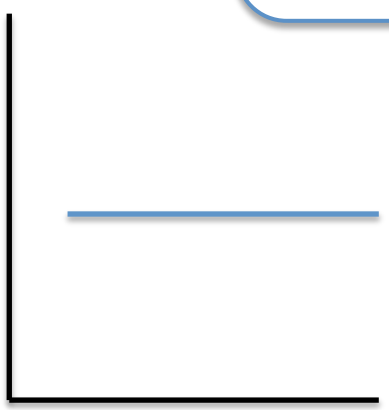




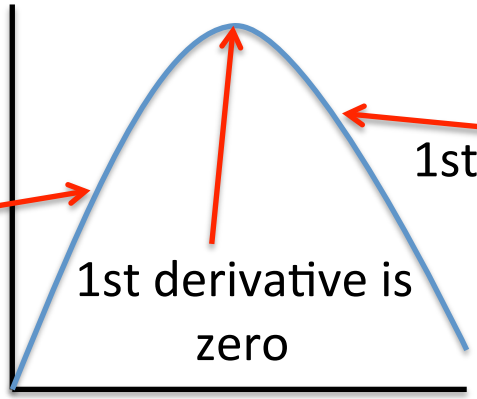
1st derivative is negative



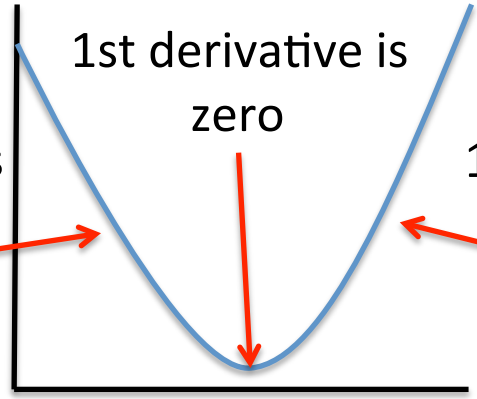
1st derivative is positive



1st derivative is zero



2nd derivative is negative



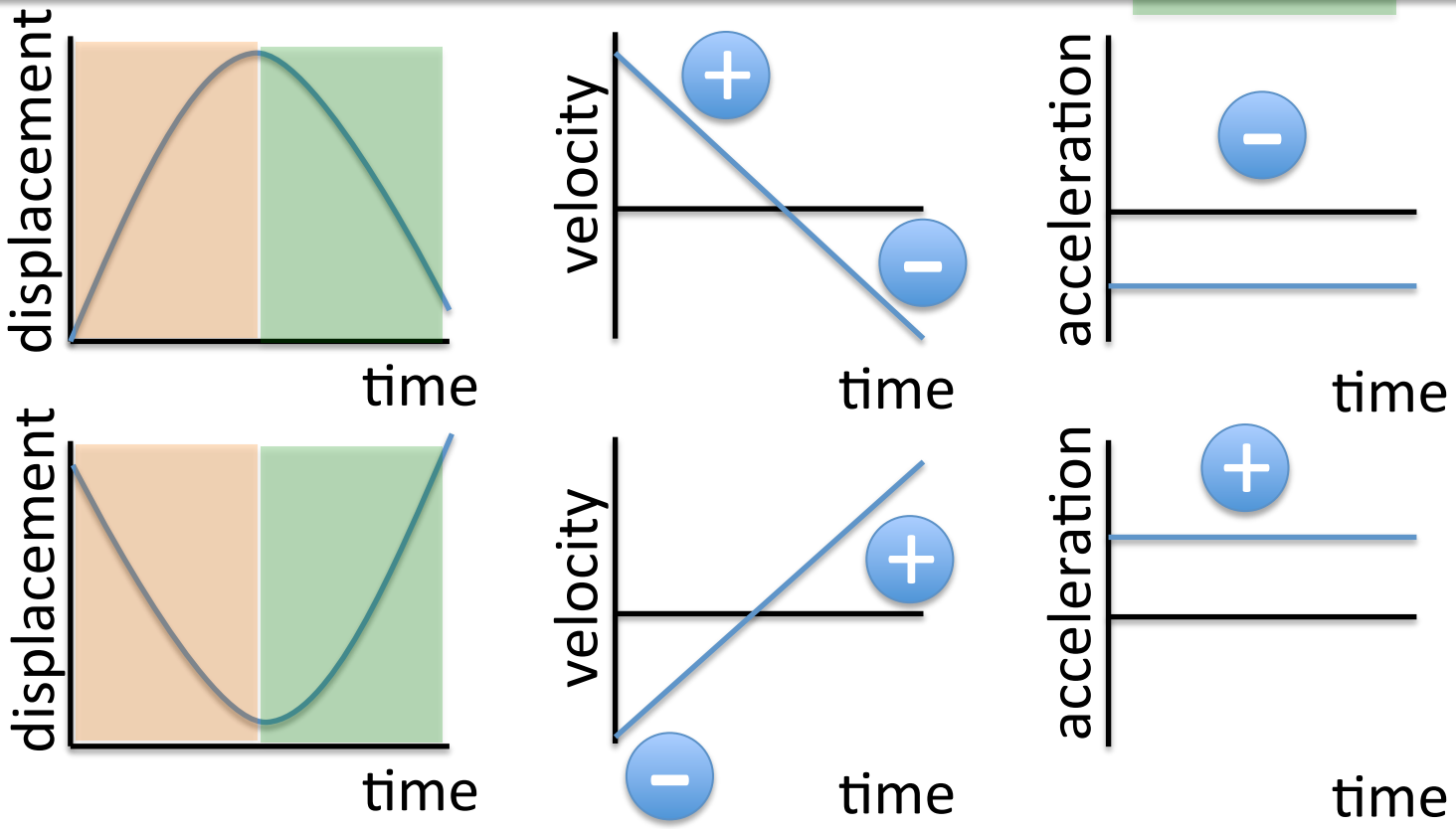
2nd derivative is positive

Graphical understanding of derivatives

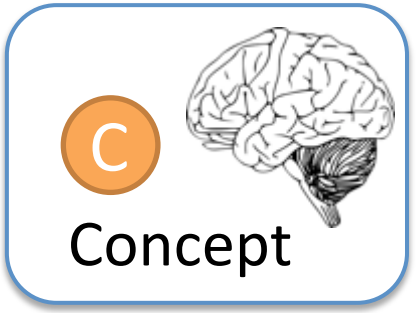
C Concept

When acceleration and velocity are opposite signs → slow down

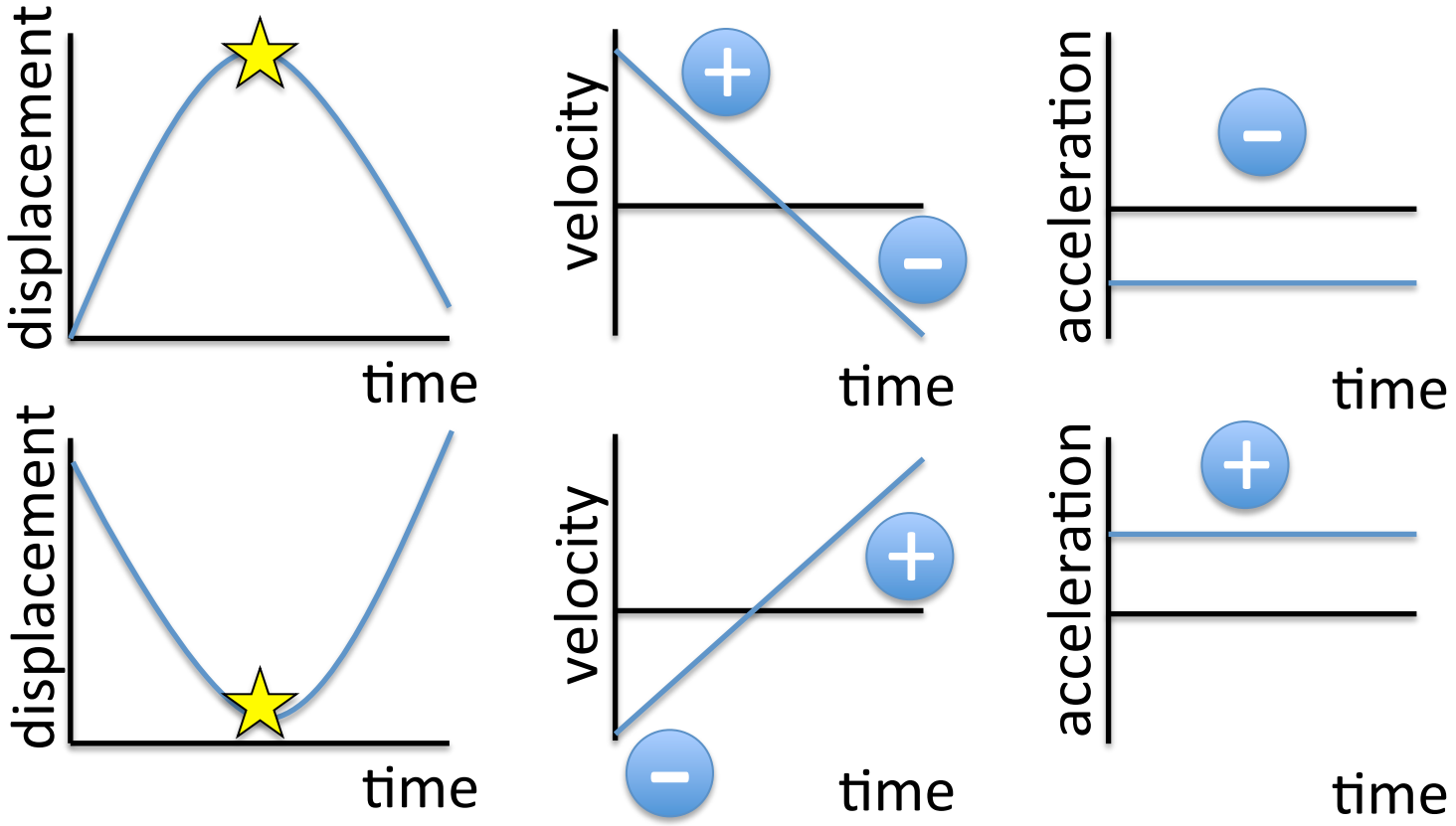
When acceleration and velocity are same sign → speed up

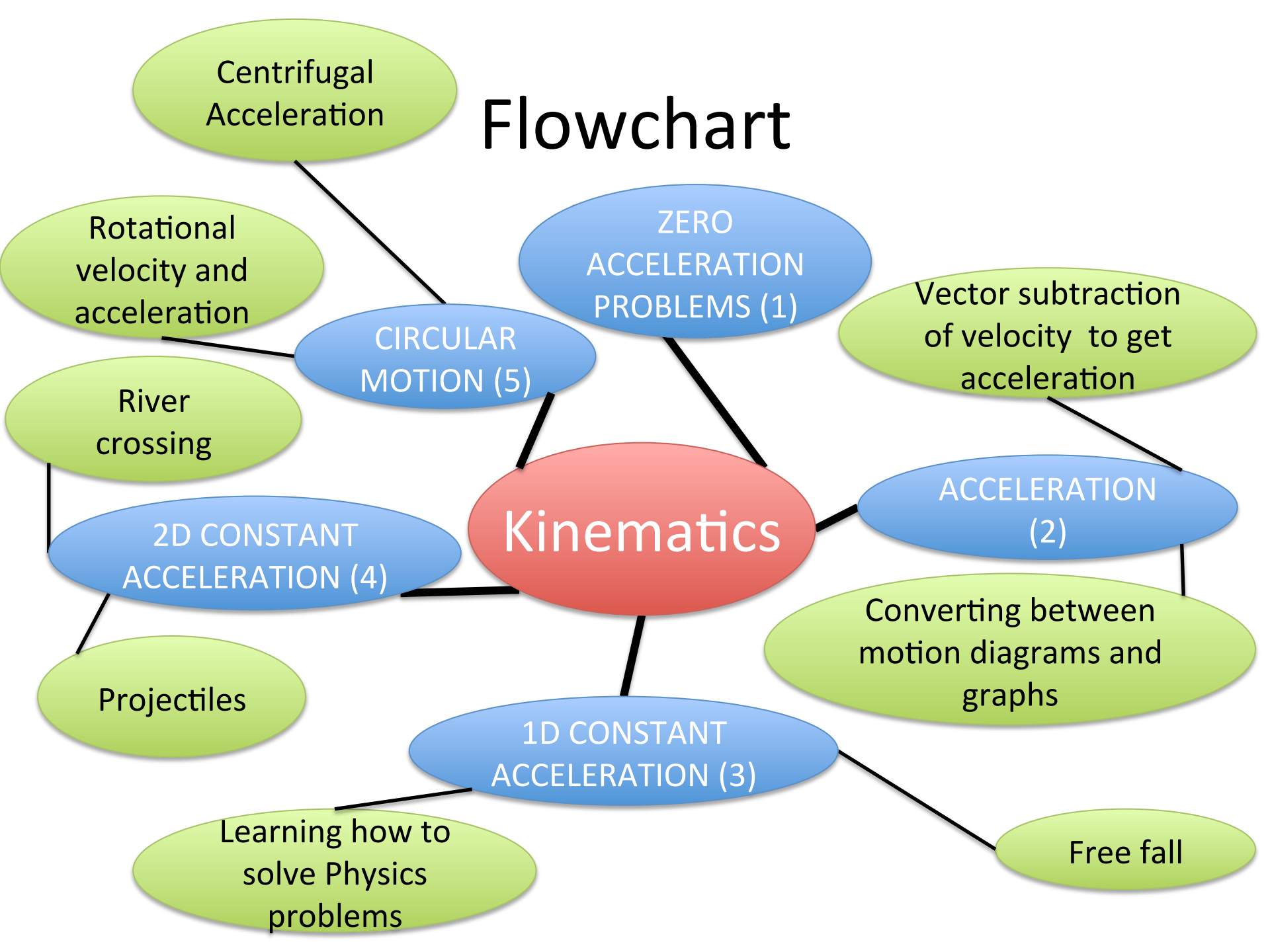


Graphical understanding of derivatives

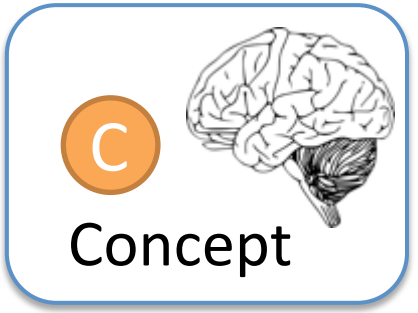


- Velocity is zero but acceleration is nonzero!




Flowchart
Kinematics
CIRCULAR MOTION (5)
ZERO ACCELERATION PROBLEMS (1)
ACCELERATION (2)
2D CONSTANT ACCELERATION (4)
1D CONSTANT ACCELERATION (3)
Centrifugal Acceleration
Rotational velocity and acceleration
River crossing
Projectiles
Vector subtraction of velocity to get acceleration
Converting between motion diagrams and graphs
Learning how to solve Physics problems
Free fall

Major concept



Take derivative
--or—
Find slope

Take derivative
--or—
Find slope

Displacement

Velocity

Acceleration

Take integral
--or—
Area under curve

Take integral
--or—
Area under curve

Displacement vs. distance

- Displacement is a vector ($\Delta\vec{x}$)

$\vec{x}(t)$

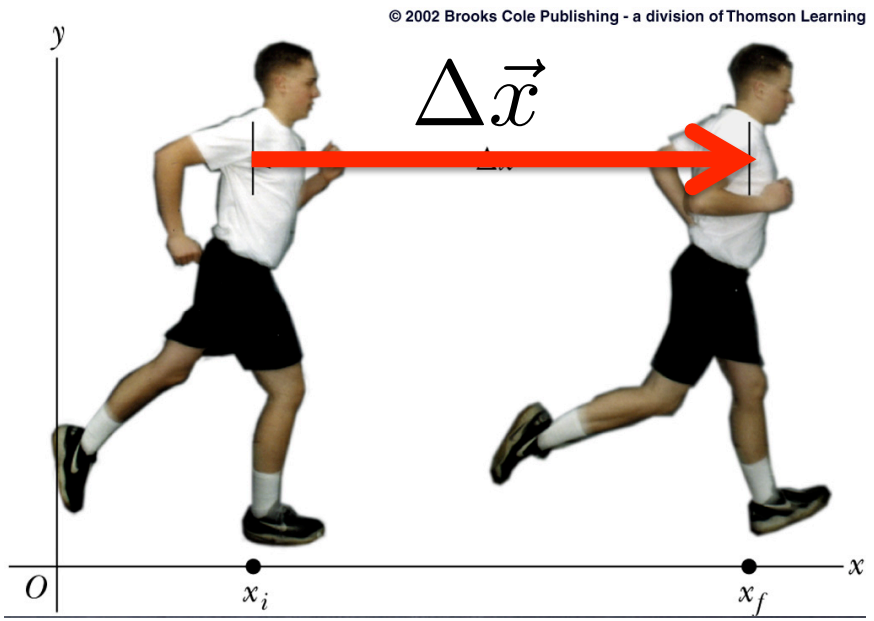
  - Position defined from the origin over time

$\Delta\vec{x} = x_f - x_i$

  - Displacement is a change in position

- Distance is a scalar (d)

$$d = |\Delta\vec{x}|$$



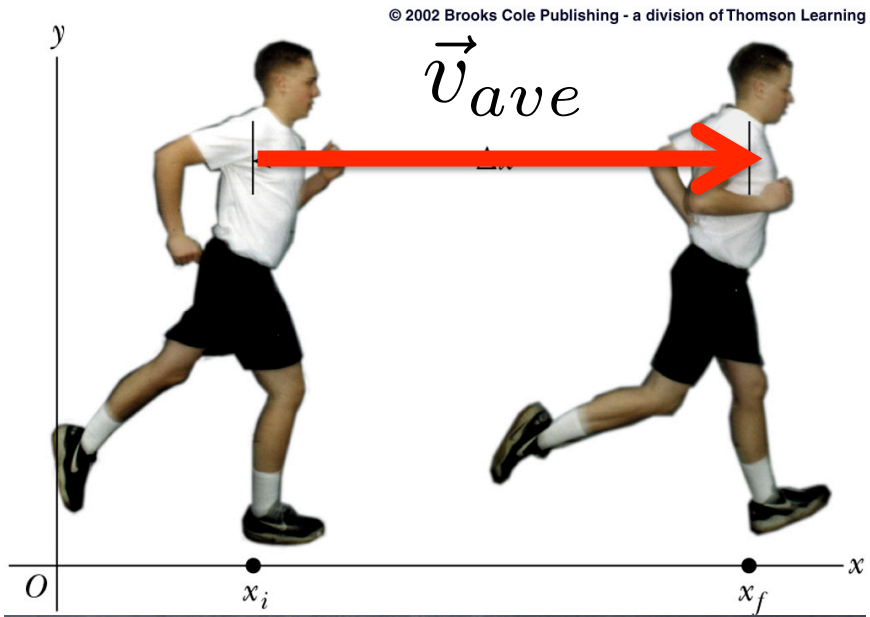
Speed vs. velocity

- Average velocity is a vector:

$$\vec{v}_{ave} = \frac{\Delta \vec{x}}{\Delta t}$$

- Speed is a scalar:

$$v_{ave} = \left| \frac{\Delta \vec{x}}{\Delta t} \right| = \frac{d}{\Delta t}$$

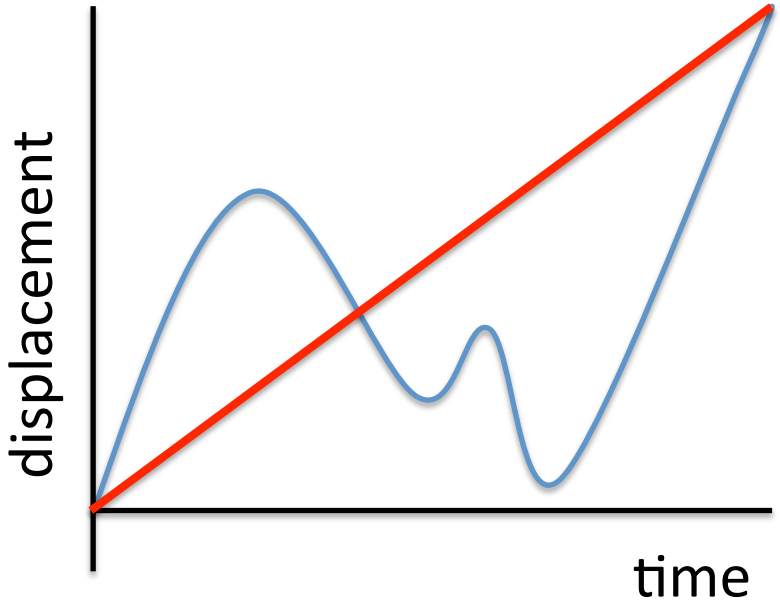


Average vs. Instantaneous velocity

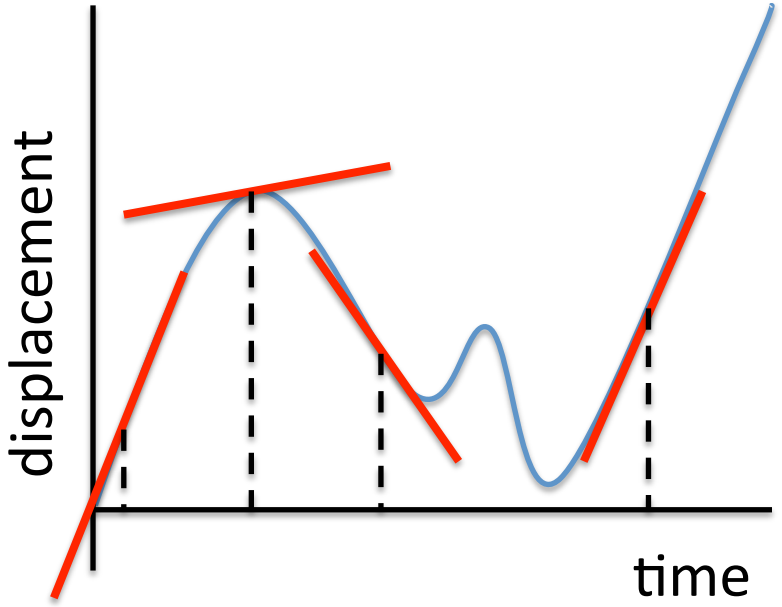
$$\vec{v}_{ave} = \frac{\Delta \vec{x}}{\Delta t}$$

$$\vec{v} = \frac{d\vec{x}}{dt}$$

Average velocity

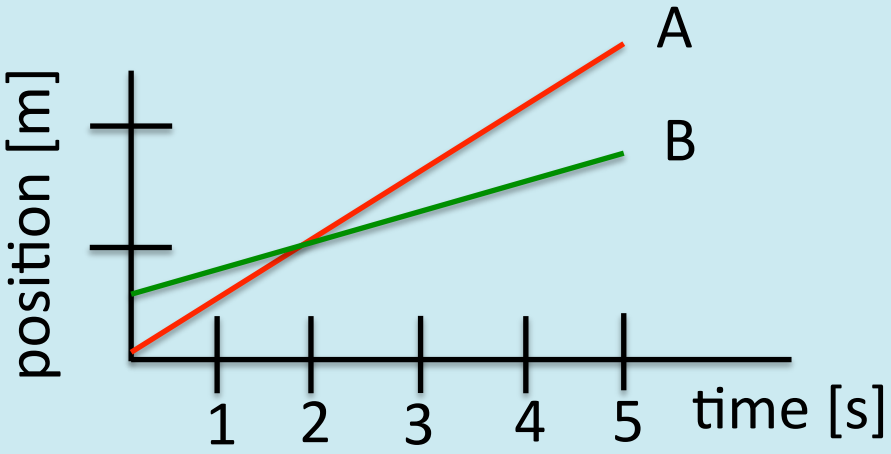


Instantaneous velocity



Clicker Question 3-2

In the following position vs time graph, when do particles A and B have the same speed?



A) at t = 1 s

B) at t = 2 s

C) at t = 3 s

D) They have the same speed the entire time.

E) They never have the same speed.

Clicker Question 3-3

- The figure shows a position verses time graph. What is the *average* velocity from 0 to 4 seconds?

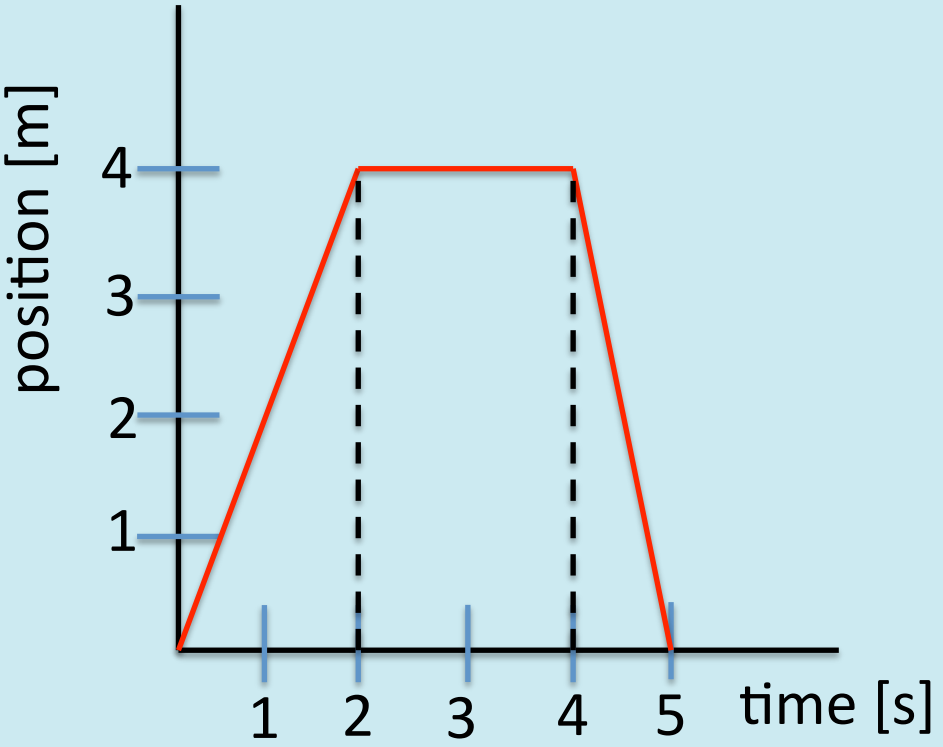
A) -2 m/s

B) -1 m/s

C) 0 m/s

D) 1 m/s

E) 2 m/s



Clicker Question 3-4

- The figure shows a position verses time graph. What is the *instantaneous* velocity at 1 second?

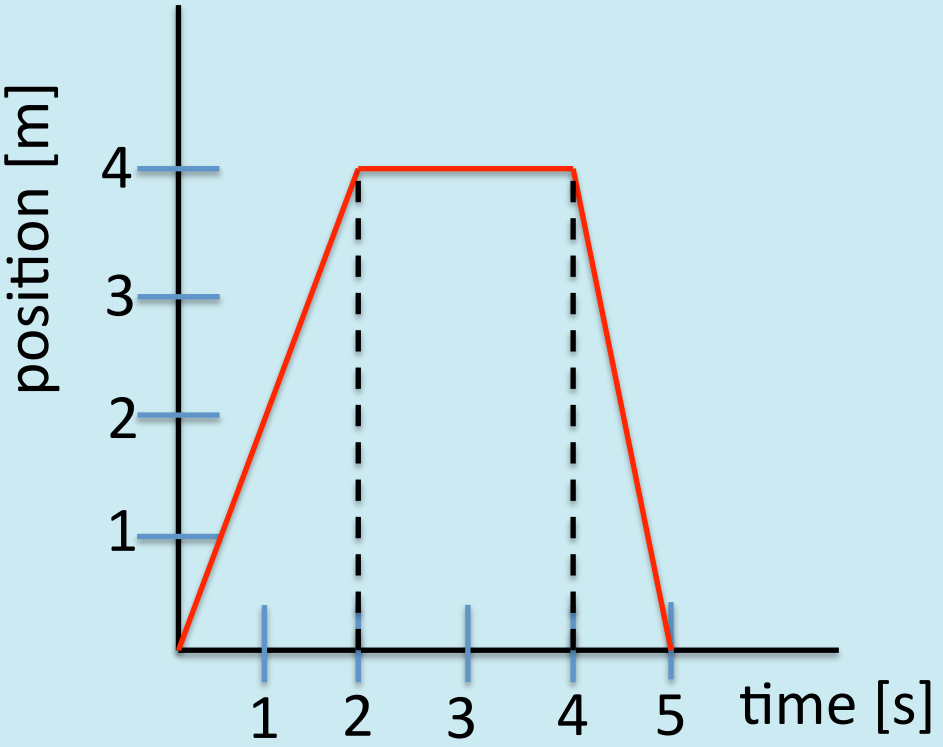
A) -2 m/s

B) -1 m/s

C) 0 m/s

D) 1 m/s

E) 2 m/s



Clicker Question 3-5

You throw a ball up into the air to a height of 1m and watch it drop back into your hand after 2 seconds. What is the average velocity and average speed of the ball over the 2 second span?

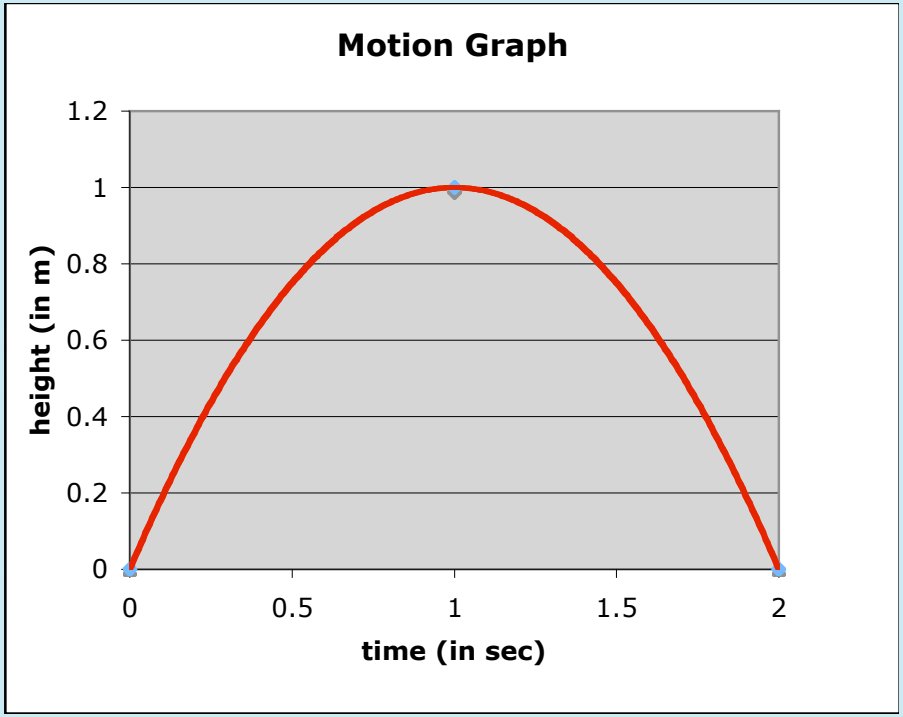
A) -2 m/s

B) -1 m/s

C) 0 m/s

D) 1 m/s

E) 2 m/s



Clicker Question 3-6

You throw a ball up into the air to a height of 1m and watch it drop back into your hand after 2 seconds. What is the instantaneous velocity at t = 1s?

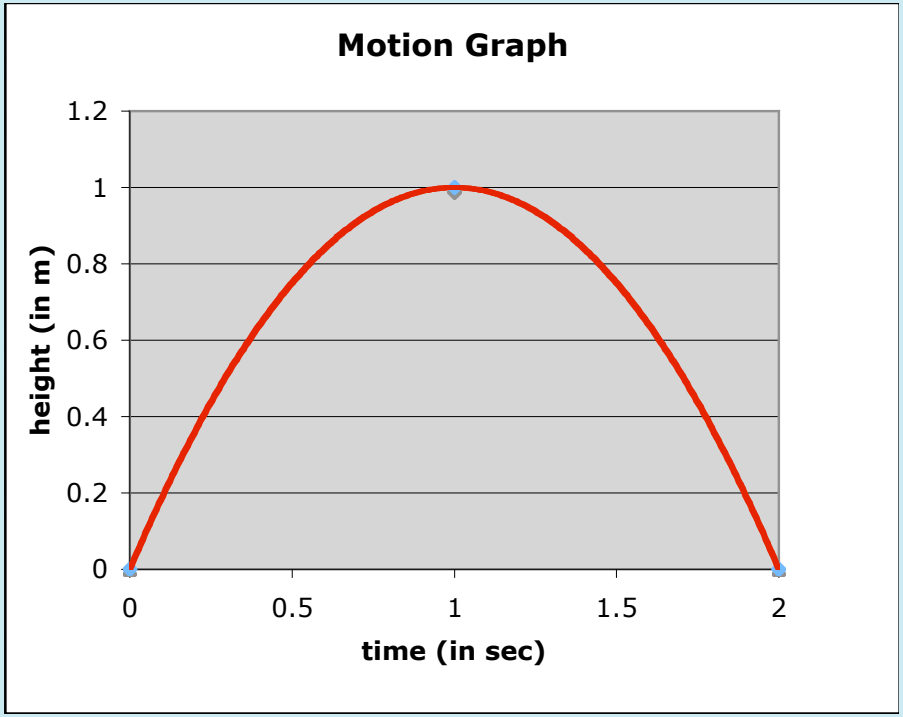
A) -2 m/s

B) -1 m/s

C) 0 m/s

D) 1 m/s

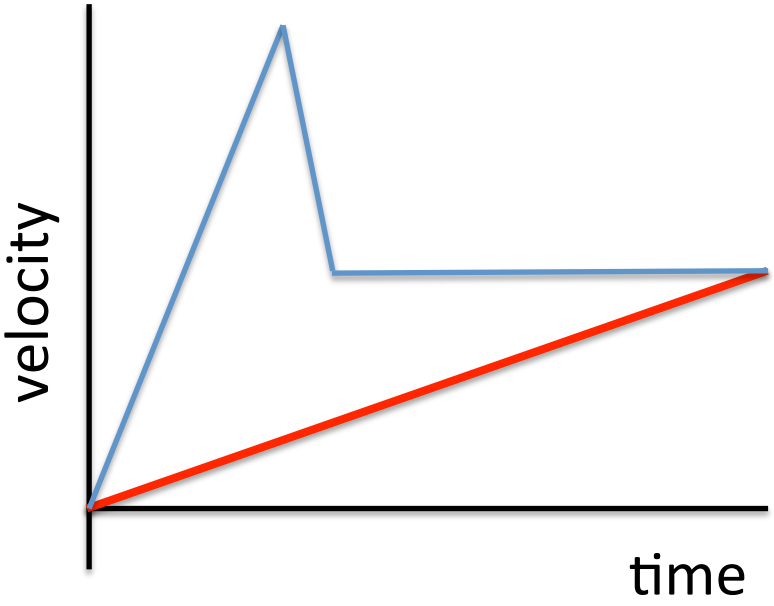
E) 2 m/s



Average vs. Instantaneous Acceleration

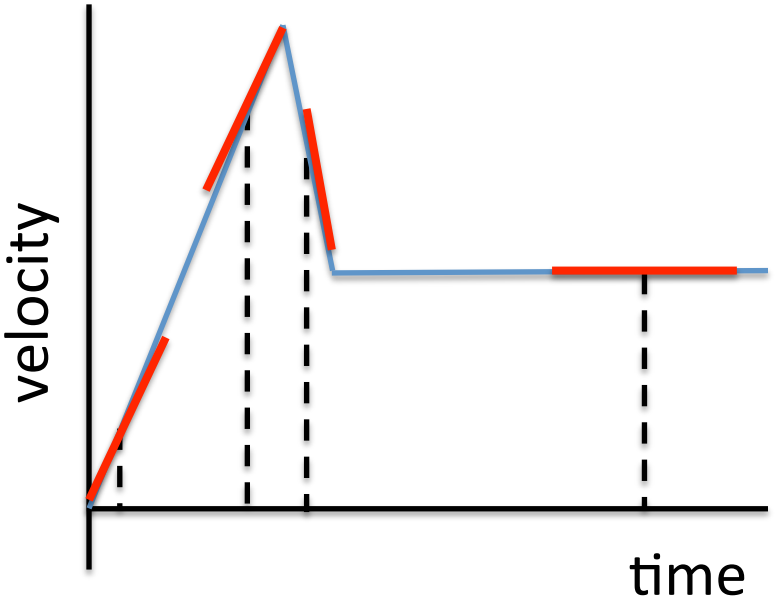
$$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$$

Average acceleration

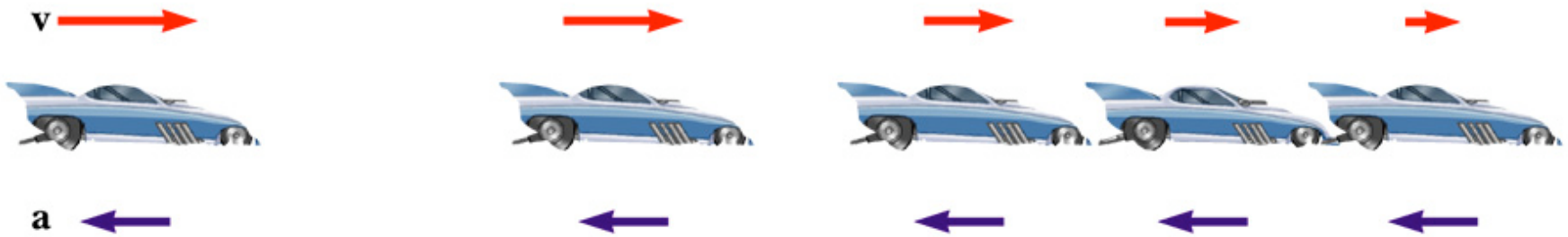


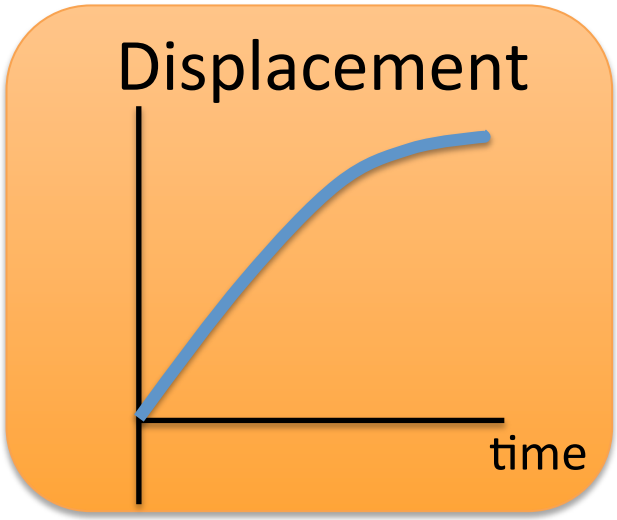
$$\vec{a} = \frac{d\vec{v}}{dt}$$

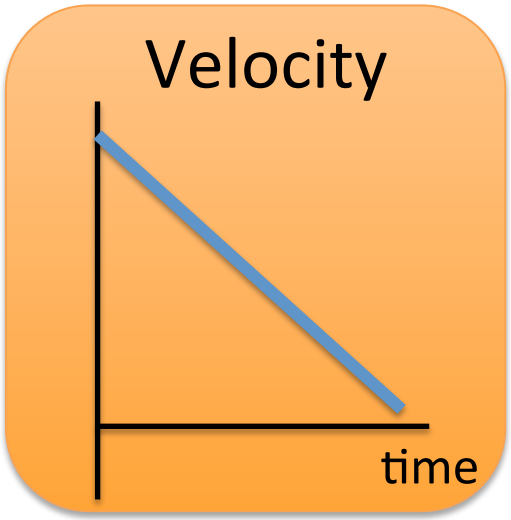
Instantaneous acceleration

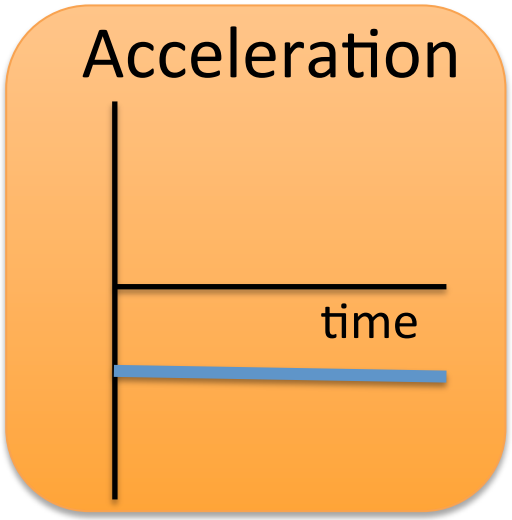


Motion diagrams ←→ Motion graphs





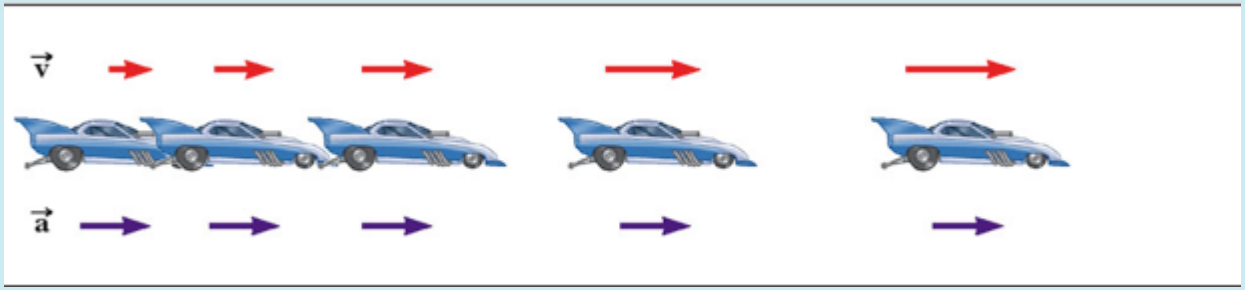




Clicker Question 3-7

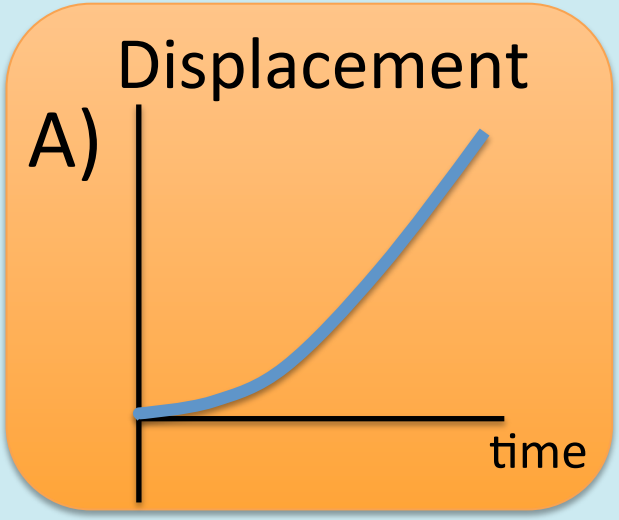
Motion diagrams ←→ Motion graphs

Which figure is drawn incorrectly?

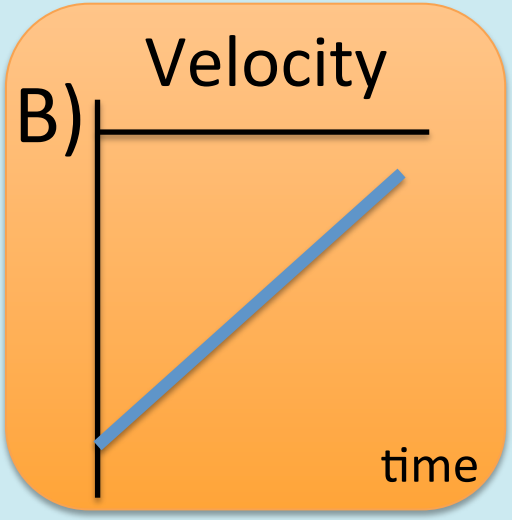


D) none

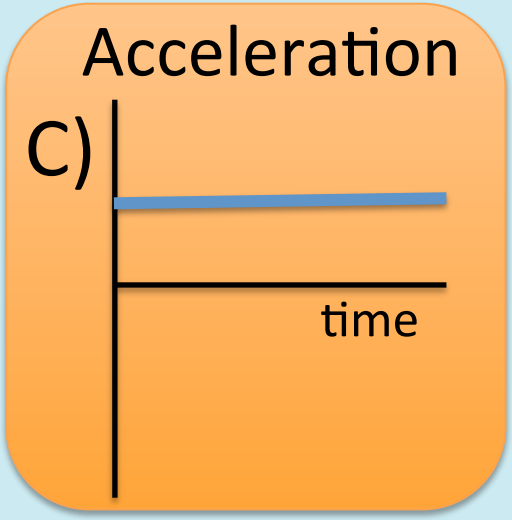
A)



B)



C)



Homework

- Get ready for tomorrow's reading quiz
  - See assignment and questions posted on website
- Finish Homework #1, which is due tomorrow
  - Download this from the website
  - Solutions will be posted after lecture tomorrow, so no late homework will be accepted