Slide A

Navigate

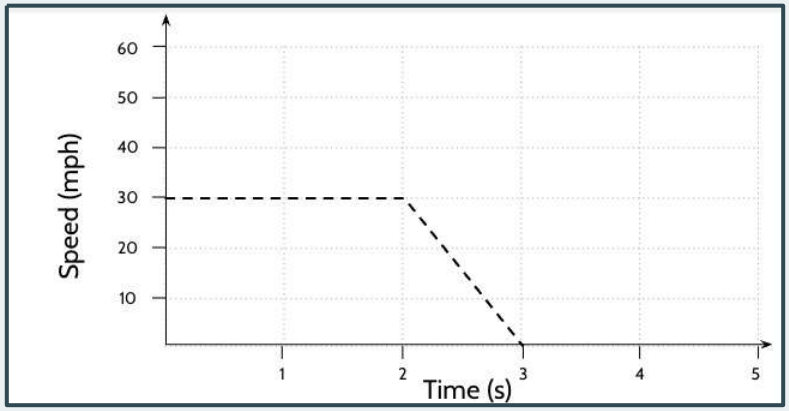
Turn and Talk

- What did we figure out last class?
- How does this new information relate to the graphs we had drawn in our notebooks in Lesson 3?
- What clues have we been using from these graphs to make sense of the motion they are representing?

Consider Differences in Slope

Every graph so far has focused on the slope and the story of speed over time.

With your class

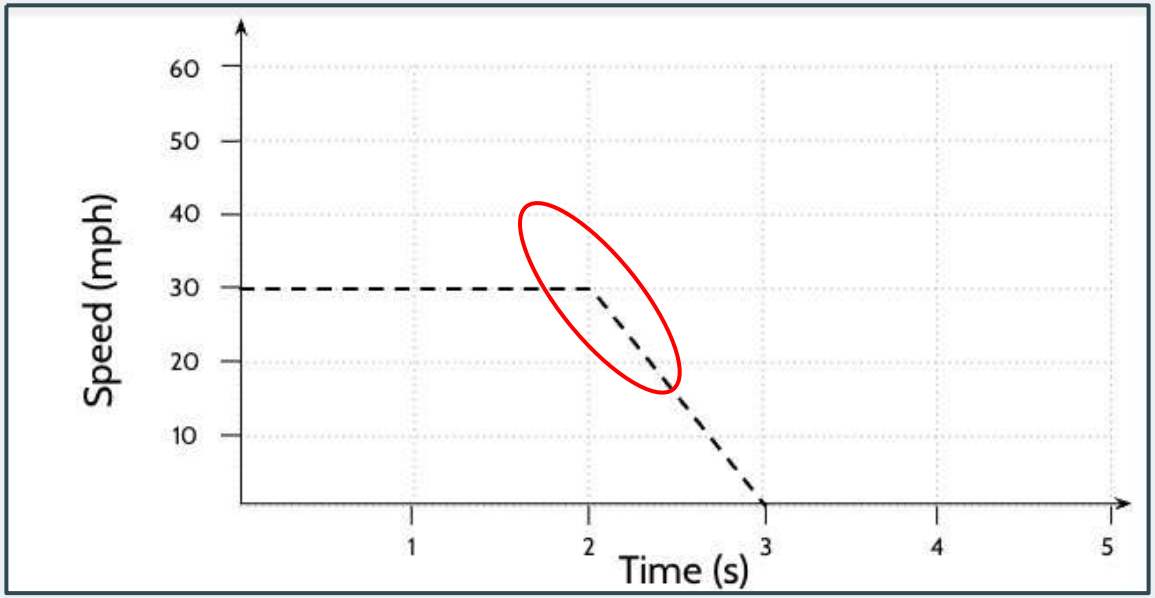


- What does a steep slope mean in a speed over time graph?
- What does a flat slope mean in a speed over time graph?

Connect Slope to Acceleration

With your class

Scientists call this slope the acceleration.



Connect Slope to Acceleration

With a partner

Using your whiteboard, draw what the slope would look like if the car was speeding up.

Is this similar to or different from the slope (the acceleration) we have been showing on our graphs so far?

Connect Acceleration to Our Problem

With your class

Why do we care about this slope?

What else do we care about?

Solve for Acceleration

$$\Delta t = \frac{m * \Delta \text{ in speed}}{F}$$

With a partner

How can we rearrange this equation so that the variables that represent acceleration (Δ in speed and Δt) are on the same side of the equation?

Add to Our M-E-F Triangle

Turn and Talk

Our new equation relates force to acceleration.

- What can we now say about the relationship between force(s) and a change in motion?
- How does this relate to our M-E-F triangle?

Consider Changes in Conditions

With your class

- If you were to look at a graph that showed the reaction and stopping times for drivers on wet pavement, what might you see happening with the braking force and reaction time?
- What changes to acceleration (the slope) might you see for rainy vs. clear conditions?

Analyze Data

Let's use our knowledge of braking force, reaction time, and acceleration to explain the differences in stopping at red lights in rainy vs. clear conditions.

With a partner

- Read the study summary together.
- Use the information to annotate the graph that best fits the study data.

JoshyST, Unsplash

Conduct a Discussion

With your class

- How would you summarize the study?
- What were the findings of the study? Which graph makes the most sense?
- How does that relate to our equations?
- How can we explain the shift in braking and reaction time?
- What does this tell us about driver behavior, forces, and acceleration in rainy versus clear road conditions?

Update Engineering Progress Tracker

On your own

Take a moment to add any new solutions to your *Engineering Progress Tracker*.

Revisit DQB

With your class

- What questions on our DQB can we now answer?
- Do you have any new questions that we should add to our DQB about objects that are not able to avoid collisions and are colliding?

Electronic Exit Ticket

On your own

Complete the Electronic Exit Ticket.

Student Content Advisory

In the next lesson, we will begin to examine the physics of vehicle collisions in detail as well as data on fatalities related to collisions.

If you need additional social or emotional support to engage with this content for any reason, please let your teacher know privately, so that they can connect you to resources.

If at any future point in the unit you find you need additional support, let your teacher or another trusted adult know how you are feeling.

Be aware that your teacher and/or your classmates may have experienced trauma related to this topic. Approach conversations about car crashes and car safety with respect, guided by your class's community agreements.

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