

Road Trip

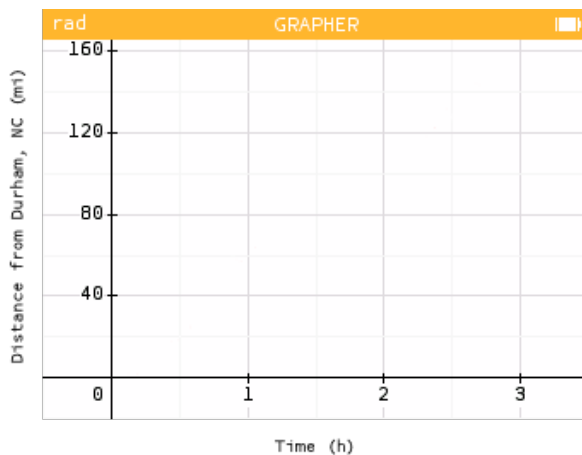
The objective of this activity is to explore how to calculate average rates of change in the context of a road trip. Students create graphs given specific scenarios and estimate the average speed between two points. This activity also leads into a discussion about how average rate of change compares to the instantaneous rate of change.

A road trip to Charlotte

Rashmi is taking a trip from Durham, NC to Charlotte, NC this weekend. It takes Rashmi 3 hours to drive the 150 mile trip. What is Rashmi’s average speed for her trip?

Choose your own adventure

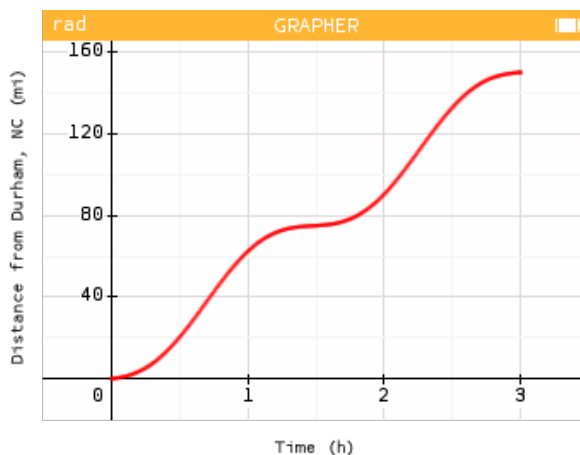
Choose **one** of the scenarios below. Sketch a possible graph that would represent Rashmi’s Distance from Durham over Time for that scenario. Then describe the rate of change throughout Rashmi’s trip in your chosen scenario.



- Rashmi sets her car’s cruise control to 50mph for the entire trip.
- Rashmi’s foot pushes steadily further down on the accelerator as she gets closer to Charlotte.
- Rashmi gets tired and lets up on the pedal throughout the trip.

A graphical representation

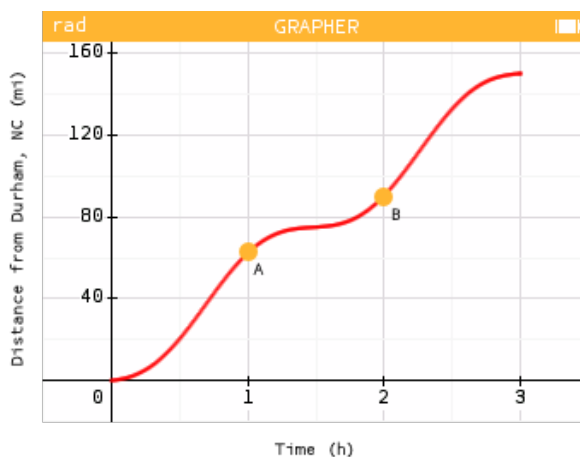
The figure below shows the graph of the function $f(t)$ which represents Rashmi's distance from Durham as a function of elapsed time t .



Think about what is happening during Rashmi's trip. Pick 2 or 3 key features of the graph and explain what they might mean in context.

Calculate an average rate

Two points on Rashmi's trip have been marked, A(1, 62) and B(2, 90), as shown below.



1. What do the values of these coordinates represent?

2. Describe how you could use these points to approximate Rashmi's average speed between hour 1 and hour 2 of her trip? Use your method to determine her average speed between these times.

How fast was she going?

Rashmi wants to know how fast she was going at exactly the 2 hour mark. Do you think her average speed from the previous question is an overestimate or an underestimate of her speed at the 2 hour mark? Explain your answer.