

Course 2 Unit 4
Lesson 2 Investigation 1 Travel Times

Lesson 2: Inverse Variation
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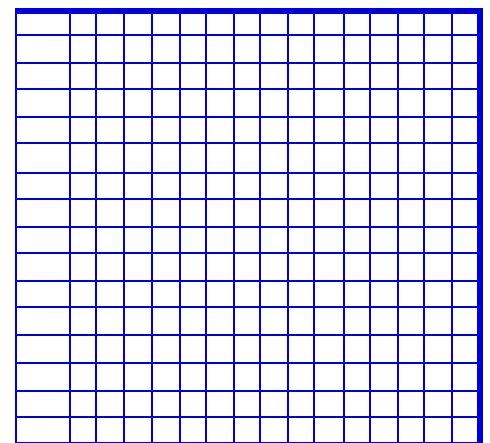
Many American take long car trips for business, vacations, and, sometimes, just commuting to work. While driving at slower speeds can save gas, driving at faster speeds can save time. For example, a 300-mile trip takes 6 hours at 50 mph, but only 5 hours at 60 mph. Think about how driving time would change if an average speed of 50 mph decreased to 40 mph.

Suppose that your family is planning a 250 mile trip by car to visit relatives. Your average speed could vary from as little as 20 mph to 60 mph or more. Your average speed depends on what roads you take, traffic, weather, speed limits, and the driver's preferred pace.

1. How long will that 250 mile trip take if you average:
 - 20 mph
 - 40 mph
 - 60 mph
2. Write a rule that gives time of trip t as a function of the average driving speed s .
 - a. Use your calculator to make a table showing (speed, time) data for the 250 mile trip. Graph the relation.

Speed (mph)	10	15	20	25	30	35	40	45	50	55	60	65
Time (hours)												

- b. Describe as accurately as possible, the pattern relating average speed and time of your trip. How is that pattern shown in the table and graph?



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3. How do each of the following increases in average speed affect the time for the 250 mile trip?
- Increase from 20mph to 30mph

 - Increase from 35 mph to 45 mph

 - Increase from 50 mph to 60 mph
4. Estimate the average speed necessary to complete the trip in 4.5 hours. How did you find the estimate?
5. Now think about the relation between speed and time for a 300 mile trip.
- a. What equation relates driving time t and average speed s for such a trip?

 - b. Which will produce a greater change in driving time: an increase from 40 to 60 mph or a decrease from 40 to 20 mph?

 - c. Estimate the average speed necessary to complete the trip in 4.5 hours.

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- a. What equation will relate distance d , average speed s , and driving time t for a trip?

- b. How does an increase in average speed change the expected driving time for a fixed distance?

- c. How is your answer to part b shown in the graphs of (*speed, time*) relations for any fixed distance?

- d. How is your answer to part b related to the form of speed-time modeling equations for any fixed distance?

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The distance between New York and Los Angeles is approximately 3000 miles.

- a. How long will a trip from NY to LA take
 - By airplane, averaging 450 mph

 - By car, averaging 60 mph

 - By bicycle, averaging 15 mph

- b. What equation gives the time t for the trip as a function of the average speed s ?

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- c. Make a table showing the relation between speed and time for speeds of 50 to 500 mph. Make the graph on your calculator.

Speed	50	100	150	200	250	300	350	400	450	500
Time										

- d. Which change in speed causes the greater change in time for the trip: an increase from 50 to 100 mph or an increase from 450 to 500 mph?