

Slope

- 1) Sandy recently made a 210 mile car trip, starting from home at noon. The graph shows how Sandy's distance from home depends on number of hours after noon. Make up a story that accounts for the four distinct parts of the graph. In particular, identify the speed at which Sandy spent most of the afternoon driving.
- 2) The Mount Major hike starts in Alton Bay, 716 feet above sea level. The summit is 1796 feet above sea level, and it takes about 45 minutes for a typical hiker to make the climb. Find the rate at which this hiker gains altitude, in feet per minute.
- 3) Exeter building code does not permit building a house that is more than 35 feet tall. An architect working on the design shown below would like the roof to be sloped so that it rises 10 inches for each foot of horizontal run.
 - a. Given the other dimensions in the diagram, will the builder be allowed to carry out this plan?
 - b. Two vertical supports (shown dotted in the diagram) are to be placed 6 feet from the center of the building. How long should they be?
- 4) A ladder is leaning against the side of a building. Each time I step from one rung to the next, my foot moves 6 inches closer to the building and 8 inches further from the ground. The base of the ladder is 9 ft from the wall. How far up the wall does the ladder reach?
- 5) Each step of the stairs leading from room 9 to room 107 in the Academy Building has a vertical *rise* of 7 inches and a horizontal *run* of 12 inches. Each step of the marble staircase leading to the Assembly Hall has a vertical rise of 5.5 inches and a horizontal run of 13 inches.
 - a. Which flight of stairs do you think is steeper? Why?
 - b. Calculate the ratio of *rise/run* for each flight of stairs, and verify that the greater ratio belongs to the flight you thought to be steeper.
- 6) (continuation) The *slope* of a line is the measure of how steep the line is. It is calculated by dividing the change in y-coordinates by the corresponding change in x-coordinates between two points on the line: $\text{slope} = \frac{\text{change in } y}{\text{change in } x}$. Calculate the slope of the line that goes through the two points (1, 3) and (7, 6). Calculate the slope of the line that goes through the two points (0, 0) and (9, 6). Which line is steeper?
- 7) Explain why the descriptions "right 5 up 2", "right 10 up 4", "left 5 down 2", "right 5/2 up 1", and left 1 down 2/5" all describe the same inclination for a straight line.
- 8) A sign placed at the top of a hill on Route 89 says "8% grade. Trucks use lower gear." What do you think that "8% grade" might mean?

- 9) Draw the segment from (3, 1) to (5, 6), and the segment from (0, 5) to (2, 0). Calculate their slopes. You should notice that the segments are equally steep, and yet they differ in a significant way. Do your slope calculations reflect this difference?
- 10) Estimate the slopes of all the segments in the diagram. Identify those whose slopes are negative. Find words to characterize lines that have negative slopes.
Need diagram
- 11) Find the slope of the line containing the points (4, 7) and (6, 11). Find coordinates for another point that lies on the same line and be prepared to discuss the method you used to find them.
- 12) A car and a small truck started out from Exeter at 8:00 am. Their distances from Exeter, recorded at hourly intervals, are recorded in the table. Plot this information in the same set of axes and draw two lines connecting the points in each data set. What is the slope of each line? What is the meaning of these slopes in the context of this problem?

<i>Time</i>	<i>Car</i>	<i>Truck</i>
8:00	0	0
9:00	52	46
10:00	104	92
11:00	156	138
12:00	208	184

- 13) (continuation) Let t be the number of hours each vehicle has been traveling since 8:00 am (thus $t = 0$ means 8:00 am), and let d be the number of mile traveled after t hours. For each vehicle, write an equation relating d and t .

